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Current State of Army Aviator Selection

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14. ABSTRACT *(Maximum 200 words)*:

The current version of the Army's Flight Aptitude Selection Test (FAST) is aging and its predictive validity has declined substantially since it was first implemented. An analysis of existing records was performed to (a) determine the impact of the FAST's declining predictive validity on aviator trainee eliminations and setbacks, and (b) estimate the benefits of increasing the FAST cut-score from its present value of 90. The analysis focused on the eliminations and setbacks that occurred during the period between January 1, 1989, and December 31, 1995. Detailed data are presented on (a) the annual number and costs of eliminations and setbacks, (b) the causes of eliminations and setbacks, and (c) the estimated consequences of increasing the FAST cut-score.

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CURRENT STATE OF ARMY AVIATOR SELECTION

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INTRODUCTION

The purpose of this research is to document the main findings and conclusions of analyses performed to assess the current state of Army aviator selection.

Problem

The predictive validity of the Army Flight Aptitude Selection Test (FAST) declined from .31 in 1988 to .17 in 1993 and a further decline is inevitable.[1] This problem is exacerbated by the fact that no alternate forms of the FAST are available that can be employed in the event that the FAST is seriously compromised. During times when research and development resources were more plentiful, evidence of the FAST's declining predictive validity would have been sufficient justification for the immediate initiation of a research and development program to produce a new, improved aviator selection test battery. In the present climate of severely limited research and development resources, however, there is a need to examine carefully the consequences of the FAST's declining predictive validity before it is possible to identify the most practical remedial measures and to argue convincingly for their implementation.

The most apparent consequences of an ineffective selection test are (a) a high rate of eliminations, a high rate of setbacks[2] or both, and (b) the dollar losses and inefficiencies associated with eliminations and setbacks. Another possible consequence of an ineffective selection test is the graduation of a larger number of students whose flying skills are marginal. Although it was possible to examine both eliminations and setbacks, it was beyond the scope of this study to assess trends in the average skill level of Army aviators at the time they joined an operational unit or their effectiveness thereafter.

Objectives

One of the primary objectives of this project was to compile data on the number of students who have been eliminated or set back because of the types of skill deficiencies, knowledge deficiencies, or behavioral problems that, in principle, are

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[1] The original FAST has been modified twice since it was originally validated in 1963. The first and second revisions are referred to as the Revised Flight Aptitude Selection Test (RFAST) and the Alternate Flight Aptitude Selection Test (AFAST), respectively. The 1988 validation was based on RFAST scores and the 1993 validation was based on AFAST scores.

[2] The term "setback" refers to a training event in which a student is removed from his or her initial training class and placed in a class that commenced training at a later time. Ordinarily, the purpose of a setback is to enable a student to repeat a portion of the flight training program. However, in the event of absence from training because of illness or a personal problem, a setback may enable the student to reenter training at the point in the program at which the student's absence commenced.

measurable by a selection test battery. When compiling data on eliminations and setbacks, it was observed that some of the causes given for eliminations and setbacks were ambiguous or misleading. This observation led to the establishment of a related objective: Conduct a detailed study of the types and frequencies of the causes cited (by instructors) for eliminations and setbacks.

Another major objective was to determine the probable benefits of increasing the FAST cut-score. Specifically, the objective was to examine the distribution of FAST scores for three groups of students and to determine the number in each group that would have been excluded if the cut-score had been greater than the current value of 90. The three groups of students include (a) students who were eliminated, (b) students who completed training but experienced one or more setbacks, and (c) students who were not eliminated from training and who completed training without a setback.

To provide a context in which to evaluate trends in eliminations and setbacks, data were compiled to identify trends in selected characteristics of (a) the individuals who applied for admission to the Initial Entry Rotary Wing (IERW) training program and (b) the individuals who were selected for admission to the IERW training program. The characteristics of interest included FAST scores, education level, and prior military experience.

Scope

Most analyses are based on events that occurred during the 6-year period between January 1, 1989, and December 31, 1995. In some instances, training events that occurred in 1988 were examined as well. Although the analysis of applicants' FAST scores was based on the individuals who took the FAST during the period 1989-1995, some of the individuals who participated in training during the period 1989-1995 took the FAST prior to 1989.

METHOD

To accomplish the objectives described above, it was necessary to compile and tabulate data from a variety of sources. Data on FAST scores were extracted from two large databases developed and maintained by the Army Research Institute (ARI) Rotary Wing Aviation Research Unit (RWARU): the RFAST archives database and the AFAST archives database. Data on the social security number (SSN), class number, race, gender, educational level, and prior military experience were obtained from one of the two databases described above or from (a) the RWARU multi-track database, or (b) the Aviation Center (USAAVNC) Automated Instructional Management System (AIMS) database.

Data on eliminations and setbacks came from two sources. One source of data was briefing slides used by training managers in their annual review briefings. The second source was the

memorandum, entitled "Changes in Class Roster," that is published weekly by the Director of Plans, Training, Mobilization, and Security. These memoranda list the type and cause of each training event that resulted in a change in the class roster, including (but not limited to) eliminations and setbacks. It was necessary to enter all data from the Changes in Class Roster into the computer manually in order to create the desired database. The size and composition of the databases developed for this project are shown in Appendix E (see Figures E-1, E-2, E-3, and E-4).

SUMMARY OF FINDINGS AND CONCLUSIONS

A brief summary of the findings is presented in the following subsections. The findings described in each subsection are followed by the conclusions that are supported by the findings.

Characteristics of Applicants

Appendix A, entitled Characteristics of IERW Applicants, contains 6 figures that show the annual number of applicants and their FAST[3] score, education level, and prior military experience.

During the period 1989-1995, there was a modest increase in the education level of applicants, as a group. The percentage of applicants with only a high school education declined. There was a corresponding increase in the percentage of applicants who had some college education or had earned a college degree.

There was a modest decrease in the percentage of civilian applicants and a modest increase in the percentage of applicants who were ROTC or Academy students. The percentages of applicants who were active duty enlisted or active duty officers remained relatively constant at about 50% and 10%, respectively.

For all education levels, applicants' FAST scores increased consistently over the period 1989-1995; the increase varied from about 8 points to about 10 points, depending on education level. FAST scores were found to be positively correlated with applicants' education level.

The findings support the conclusion that the characteristics of applicants changed in two ways during the period 1989-1995: (a) applicants' education level has increased, and (b) FAST scores have increased for all four of the educational groups examined.

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[3] The databases compiled for this project included both RFAST scores and AFAST scores. For the sake of simplicity, the general term "FAST" is used throughout this report to refer to RFAST and AFAST tests or scores except in the few instances in which it is important to distinguish between the two forms of the test.

Characteristics of IERW Students

Appendix B, entitled Characteristics of IERW Students, contains 7 figures that show the annual number of applicants selected for entry into the IERW training program and their FAST score, education level, and prior military experience.

As was true for applicants, the average education level of IERW students increased during the period 1989-1995: the percentage of high school graduates declined, the percentage of college graduates increased, and the percentage with some college remained about the same.

There were no consistent changes in the prior military experience of IERW students. However, each year, between 70% and 75% of the students selected for entry into the IERW training program were on active duty at the time they were selected.

Although the FAST scores of applicants increased during the period 1989-1995, there was no corresponding change in the FAST scores of IERW students. This finding is surprising. It would be expected that the decrease in training slots[4] would have enabled the Selection Board to select applicants with higher FAST scores.

The findings support the conclusion that the education level of IERW students has increased since 1989 but, during the same period, students' FAST scores remained about the same. The findings also support the conclusion that the Selection Board is not using FAST score as a means to be more selective.

Eliminations and Setbacks

Appendix C, entitled Number of Eliminations and Setbacks, contains 7 figures that show the annual number and the causes of eliminations and setbacks. All of the data in Appendix C were obtained from briefing charts prepared by USAAVNC personnel. The data identify only two general causes of eliminations and setbacks: flight deficiency and administrative.

Flight deficiency eliminations declined from a high of 177 in 1991 to between 9 and 27 in the following years. Administrative eliminations declined from a high of 107 in 1990 to 28 in 1995, with the largest decline occurring between 1990 and 1991.

Flight deficiency setbacks decreased from a high of 342 in 1989 to a low of 74 in 1995. The data for administrative setbacks was incomplete. However, it is known that there were about 500 administrative setbacks in both 1990 and 1991 and that there were only 129 administrative setbacks in 1995.

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[4] IERW training slots decreased from a high of 1,696 in 1991 to 958 in 1995.

The findings support the conclusion that both eliminations and setbacks have declined dramatically in recent years. The USAAVNC officials who were briefed on the findings judged that the data provide no evidence that eliminations and setbacks represent a serious problem at the present time. In particular, USAAVNC officials judged that the numbers of eliminations and setbacks are not great enough at present to justify initiating work on a new aviator selection test battery. It is important to acknowledge, however, that this conclusion was not based on an objective analysis of the relative cost of developing a new selection test battery and the savings realized from reducing eliminations and setbacks.

Estimated Cost of Eliminations and Setbacks

Appendix D, entitled Estimated Cost of Eliminations and Setbacks, contains 9 figures that show the current cost of each phase of IERW training and the cost of Aircraft Qualification Course (AQC) training in each type aircraft. The figures also show estimates of the annual costs of eliminations and setbacks, based on the frequencies reported by USAAVNC.

Because elimination and setback costs are a multiple of their frequencies, the cost trends are the same as the trends, described above, for the number of elimination and setbacks. The cost data quantify the enormous benefits realized from preventing eliminations and setbacks through effective aviator selection. The cost data also quantify the great benefits of eliminating aviators earlier rather than later in the training program.

The USAAVNC officials who were briefed concluded that the dollar cost of eliminations and setbacks is not great enough at present to justify initiating work on a new aviator selection test battery. However, this conclusion was not based on a careful analysis of (a) the cost developing and validating a new test battery and (b) the savings associated with reduced eliminations and setbacks over the life of a new test battery.

Databases Developed

Appendix E, entitled Size and Composition of Databases, contains 4 figures that show the size and composition of the databases developed to accomplish the objectives of this project.

The training event database contains data on virtually all of the eliminations and setbacks that occurred during the period 1988-1995. The database also includes all events that are functionally the same as eliminations and setbacks but have a different name. FAST scores were located for about 70% of the individuals who were eliminated or who experienced one or more setbacks.

It was possible to compile a large comparison database for both IERW students (6,246) and AQC students (4,372). However, the sample size for females and for individual non-white racial groups was too small to support some of analyses that were of interest.

Analysis of Causes of Eliminations and Setbacks

Appendix F, entitled Causes of Eliminations and Setbacks, contains 10 tables and 6 figures that show the results of a detailed analysis of the types and frequencies of causes cited by instructors for eliminations and setbacks. All data for this analysis came from the weekly memoranda listing changes in the class roster, which is published weekly by the Director of Plans, Training, Mobilization, and Security. These data were augmented with information obtained during interviews with subject matter experts (SMEs) about the meaning of some causes cited for eliminations and setbacks.

The analysis identified 274 unique descriptors that were cited as causes of eliminations or setbacks. Some of the descriptors were clear and specific in their identification of the cause of the elimination or setback. However, a large number of descriptors were so vague that it was difficult or impossible to determine whether the cause was due to (a) a skill/knowledge deficiency or behavioral problem, or (b) a personal problem or a purely administrative problem.

The interviews with SMEs revealed that many of the causes cited for eliminations and setbacks do not reflect the true cause of the eliminations and setbacks. The best example is "medical" eliminations and setbacks. The SMEs reported that, in many cases, students who are performing poorly in training claim that they have a medical problem, thereby, receiving a medical elimination or setback rather than a flight deficiency elimination or setback. The SMEs suggested that the use of misleading causes is more common during IERW training than AQC training.

The data show that a large number of setbacks are due to administrative problems. It can be argued that administrative setbacks replace some setbacks that result from a knowledge/skill deficiency or from a behavior problem. That is, a non-administrative setback may have been necessary if a marginal student had not received the extra training that was given because of an administrative setback.

The data in Appendix F support the five general conclusions listed below.

- There is a lack of consistency and reliability in the current practice of designating the cause of eliminations and setbacks.

- Because of the problems in designating cause, the number of flight deficiency eliminations and setbacks reported by USAAVNC is an underestimate of the number of eliminations and setbacks that are the result of a knowledge/skill deficiency or behavior problem.

- Because of the problems in designating cause, neither eliminations nor setbacks constitute a reliable criterion for use in selection test validation. The large number of administrative setbacks further reduces the value of setbacks as a validation criterion.

- The number of eliminations and setbacks that are due to behavior problems (e.g., misconduct, honor code violation) is large enough to justify the development of test instruments to exclude applicants with behavior problems.

Interviews with SMEs, all of whom are highly experienced members of the aviator training staff at Fort Rucker, revealed that the reported cause of eliminations and setbacks often does not reflect the true cause. They reported that the most commonly misused causes are "resignation," "medical," and "personal problems." The SMEs stated that many of the eliminations and setbacks attributed to one of these three causes are, in fact, due to a student's knowledge/skill deficiency or behavioral problem. For example, the SMEs explained that a resignation is not as damning as a flight deficiency elimination or an elimination due to a conduct problem. Similarly, SMEs explained that students who are doing poorly in training often claim a medical problem and, as a result, are given a setback. The setback affords the student additional study time and, usually, additional flight hours. Similar examples were given for the misuse of the cause "personal problems."

The conclusion that the number of flight deficiency eliminations and setbacks is underestimated in the USAAVNC reports is based on (a) the SMEs reports of the misuse of causes of eliminations and setbacks and (b) the relatively large number of eliminations and setbacks that are attributed each year to the misused causes: resignation, medical, and personal problems. Unfortunately, the data do not support quantitative estimates of the frequency with which these causes are misused.

Cut-Score Analysis

Appendix G, entitled Results of Cut-Score Analysis, contains 10 figures that show the results of the cut-score analysis.

The results of the cut-score analysis were consistent across training programs (IERW and AQC), racial groups (white males vs. non-white males), and gender groups. For every group and at every cut-score between 100 and 120, more eliminees and individuals with setbacks would have been excluded than individuals in the

associated comparison group. However, as would be expected from knowledge of the AFAST's low predictive validity, the AFAST did not prove to be a highly effective discriminator.

For white male eliminees, increasing the cut-score to a value between 100 and 110 would have excluded from 12% to 18% more eliminees than individuals in the comparison group. For non-white male eliminees, increasing the cut-score to 100 would have excluded about 22% more eliminees than individuals in the comparison group; however, the benefits of increasing the cut-score declined slightly as the cut-score increased above a value of 100. For both white and non-white males, increasing cut-score would have excluded more individuals eliminated because of skill or behavior problems than individuals who were eliminated for other reasons.

Increasing cut-score was found to be less effective for excluding individuals with setbacks than excluding eliminees. In most instances, increasing the cut-score to any value between 100 and 120 would have excluded about 5-8% more individuals with setbacks than individuals in the comparison group. For white males, increasing cut-score would have excluded 5-12% more individuals with setbacks due to skill or behavior problems than individuals with setbacks due to other problems. However, this difference was not as large and not as consistent for other groups.

The data in Appendix G support the conclusion that limited benefits would be realized from increasing the FAST score from 90 (current cut-score) to a value between 100 and 120. That is, increasing cut-score would result in the exclusion of proportionately fewer successful students (students who complete training with no setbacks) than unsuccessful students (students who could not complete training or who required one or more setbacks). However, the feasibility of increasing cut-score depends on whether the applicant pool is large enough to fill the training slots with individuals with a FAST score as high or higher than the new cut-score.

RECOMMENDATIONS

It is recommended that USAAVNC develop and implement an improved system for designating the true cause of eliminations and setbacks. It is further recommended that a computer-based system be developed that requires instructors to select the appropriate cause from among a prescribed list of causes and that instructor personnel be required to enter detailed information about a student's performance at the time of a medical or any other type of administrative elimination or setback. The resulting data would be extremely valuable for training managers; the data are essential for validating current and future aviator selection tests.

Because increasing the cut-score is mainly an administrative decision, it is recommended that Selection Board representatives examine the feasibility and acceptability of increasing the cut-score from 90 to a value between 100 and 110. This examination should consider both the size and qualifications of the applicant pool and the likelihood that a change in cut-score would stimulate claims of race or gender bias.

A final recommendation is to develop an improved system to assess aviators' proficiency and effectiveness upon completion of institutional training and assignment to an operational unit. The importance of this recommendation cannot be overemphasized. The recommendation stems from two related concerns. One concern is the declining predictive validity of the FAST. The second concern is the continued decline in training resources and the resultant increase in the pressure on members of the training community to minimize the losses associated with eliminations and setbacks. As the quality of candidates continue to decline, a time must come when it is simply not possible to maintain elimination and setback rates at their current low level without a decline in the proficiency and effectiveness of the average graduate. To avoid the unacceptable consequences of a decline in graduate proficiency, it will be necessary to create a performance assessment system that is independent of the institutional training community and the pressures to keep the elimination and setback rates low. Because of the need to detect proficiency changes over time, it is essential that the system employ proficiency assessment methods and procedures that ensure that both performance standards and performance measures remain stable over time.

Although the cost of developing and operating a post training proficiency assessment system is certain to be relatively high, the resulting proficiency measurement data will benefit the Army in two important ways. First, the data will enable Army officials to monitor the proficiency of their graduate aviators and to provide immediate feedback to the institutional training community in the event that a decline in proficiency is detected. Secondly, the performance measures will provide a highly useful validation criterion for use in validating current and future aviator selection tests.

Although USAAVNC officials concluded that the current number of eliminations and setbacks is not large enough to justify a recommendation to commence work on a new test battery to replace the aging AFAST, a number of events could result in an immediate and pressing need for a new aviator selection test battery. One such event is a serious compromise of the AFAST. Another is a military crisis that results in a sudden increase in the requirement for trained Army aviators.

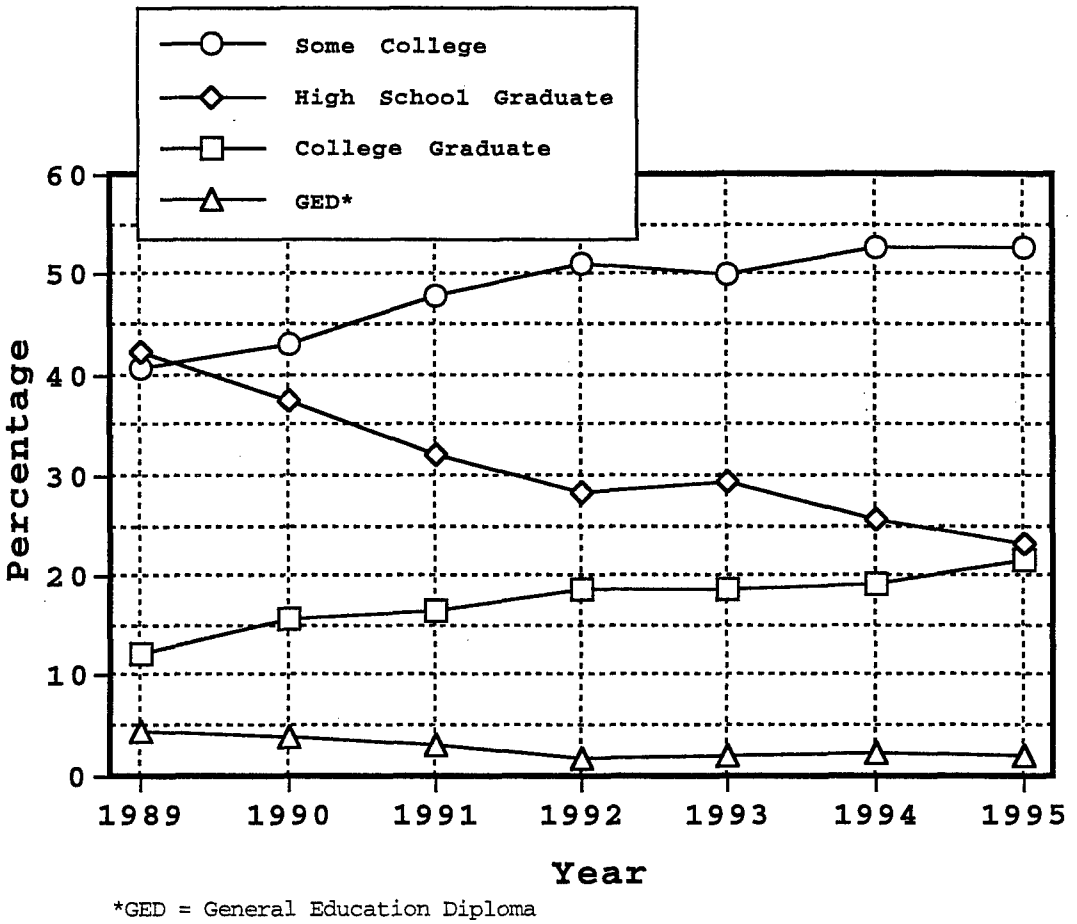
If such events occur, it can be expected that at least a 3-year effort would be required to develop and validate a new aviator selection test battery. Test development could be

expedited somewhat by increasing the number and expertise of the personnel assigned to a test development team. However, little can be done to expedite the validation process. The effectiveness of test validation is largely dependent on the number of students who have taken the test and whose performance in training is known. Hence, the elapsed time required to validate a selection test battery is mainly a function of the size of the student population.

Appendix A
Characteristics of IERW Applicants

Comments:

The figures in Appendix A show selected characteristics of all individuals who applied for entry into the IERW program during the period 1989-1995. The characteristics examined include education level, prior military experience, and FAST score. It should be noted that any individual who took the FAST test was considered an applicant even though it is known that some ROTC students and some Army Academy students who took the test had no serious intent to apply for entry into the flight training program. To illustrate changes over time.



*GED = General Education Diploma

Figure A-1. Education level of individuals who took the FAST during the period between 1989 and 1995.

Comments:

The individuals who take the FAST each year are considered the applicant pool. However, not all the individuals in the applicant pool apply for admission to flight school after taking the test.

Figure A-1 shows that the average level of individuals in the applicant pool increased during the five-year period shown. High school graduates decreased by about 17% while college graduates increased by about 9% and individuals with some college increased by about 12%. The percentage of individuals with only a GED remained uniformly low.

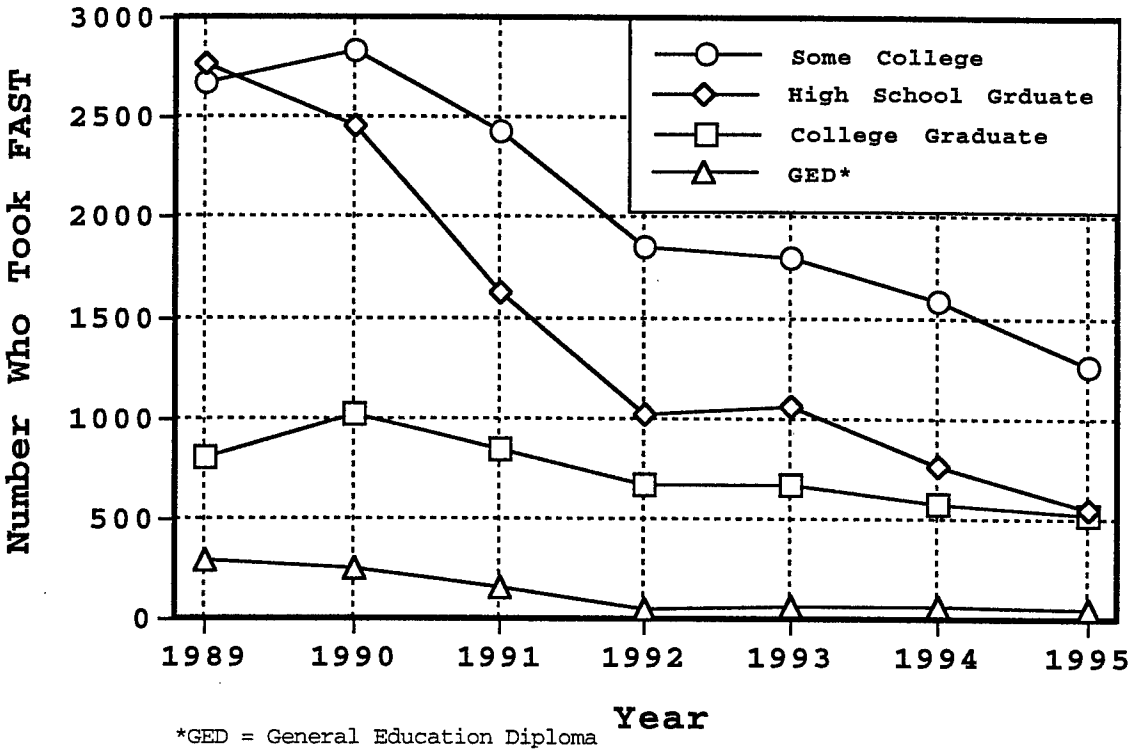


Figure A-2. Number of FAST tests administered per year by education level.

Comments:

Figure A-2 shows the large decrease in the number of FAST tests administered per year during the period between 1989 and 1995. Although some decrease is shown for all four education levels, the largest decrease is the number of high school graduates and the number of individuals with some college. In 1995, about the same number of college graduates were tested as high school graduates.

The available data show that the total number of FAST tests administered decreased from 6,570 in 1989 to 2,407 in 1995. However, the ARI database does not include data on every FAST test that is administered.

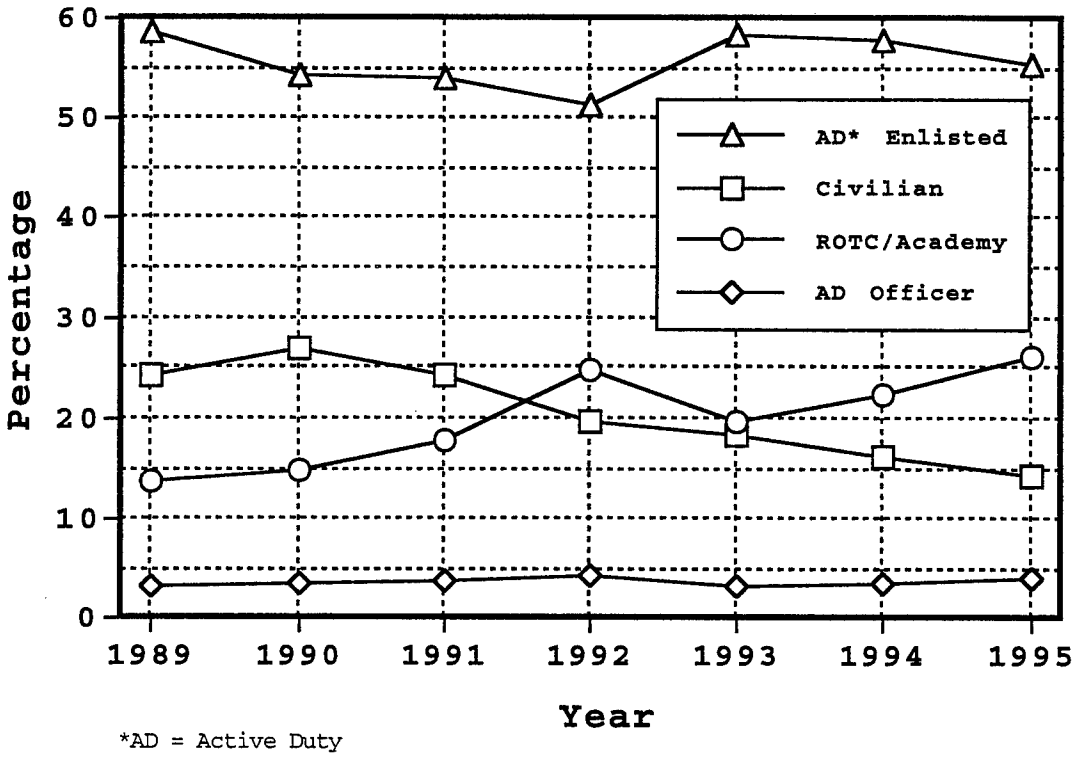
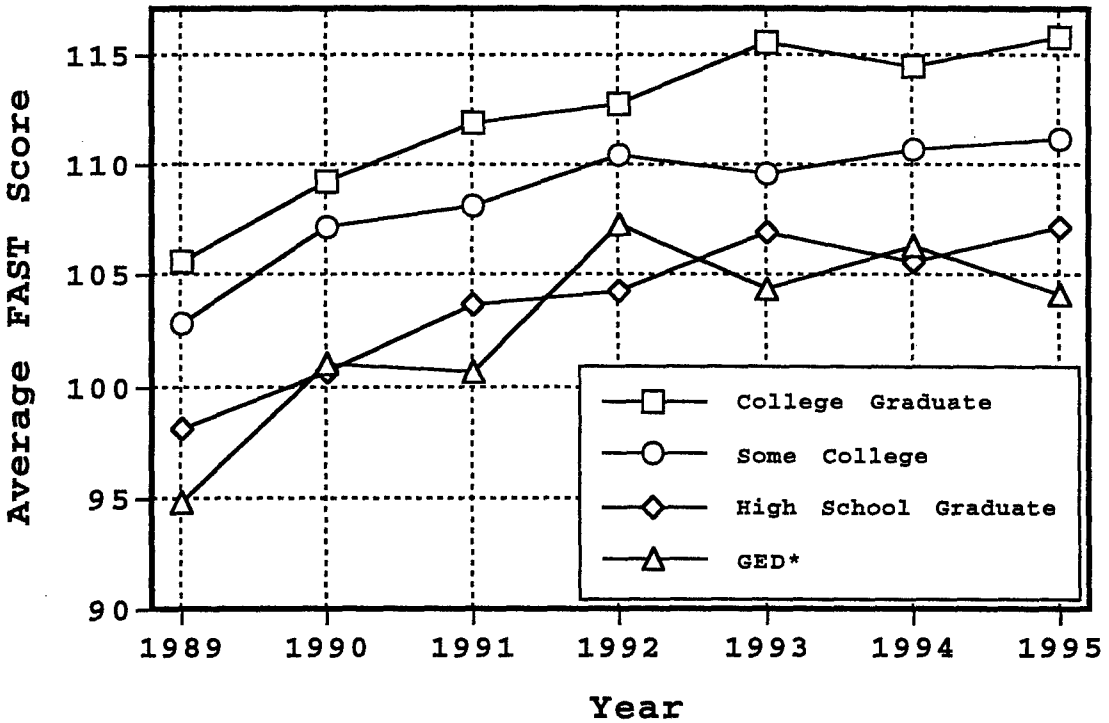


Figure A-3. Prior military experience of individuals who took the FAST during the period between 1989 and 1995.

Comments:

Active duty enlisted accounted for more than 50% of the individuals who took the FAST, and active duty officers accounted for fewer than 10%. The percent who were civilians at the time they took the test declined from about 25% to about 15%. The percentage who were ROTC or Academy students or recent graduates at the time they took the test increased from about 14% to about 26%.



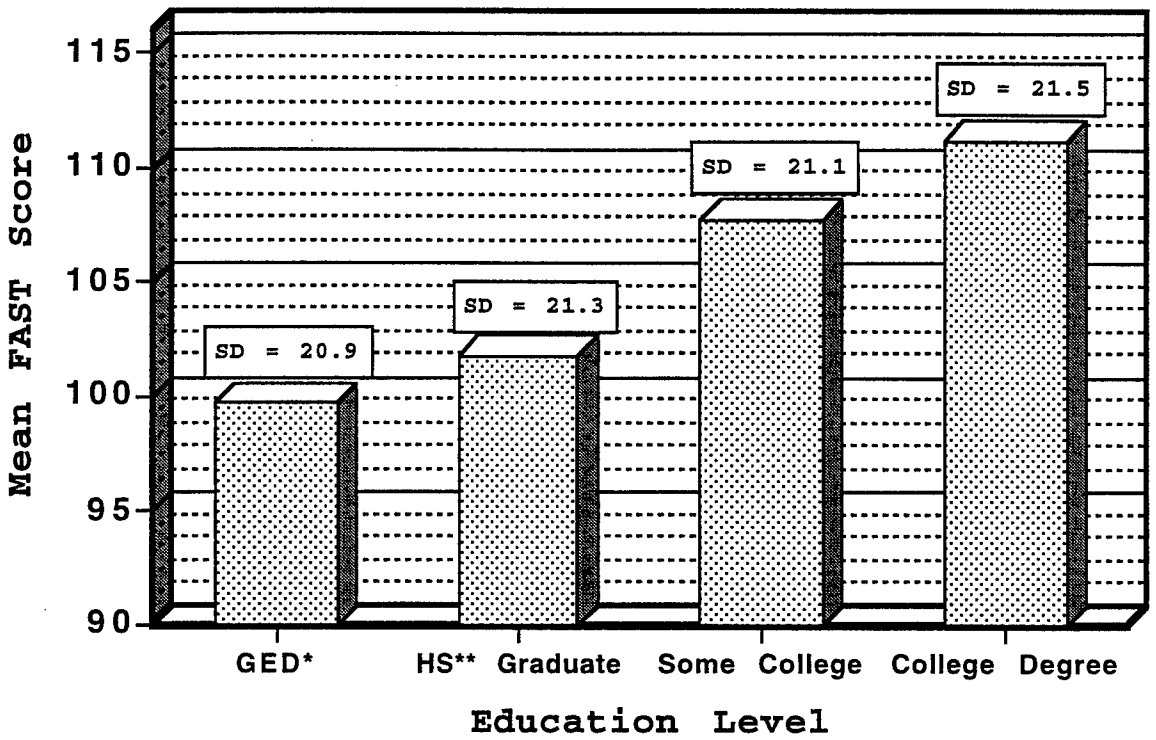
*GED = General Education Diploma

Figure A-4. Applicants' FAST scores as a function of education level and year.

Comments:

The FAST scores of applicants are positively related to the applicants' education level. The test scores of college graduates is no more than 5 points higher than the test scores of individuals with some college, but is nearly 10 points higher than the test scores of high school graduates. (It should be noted that some individuals with some college at the time they took the test subsequently completed college.) Although there is no apparent difference in the FAST scores of high school graduates and individuals with a GED, the number of individuals with only a GED is very small.

For all education levels, FAST scores increased consistently as a function of time. Average FAST scores increased by a value that varied from about 8 points (high school graduates) to about 10 points (college graduates).



*GED = General Educational Diploma
**HS = High School

Figure A-5. Mean and standard deviation of applicants' FAST scores as a function of education level at the time the FAST was taken.

Comment:

The mean FAST scores of applicants are positively related to applicants' education level, but the difference is not large. The mean score for college graduates (111.2) is only about one-half standard deviation larger than the mean score of individuals with only a GED (99.7). As can be seen, the standard deviation is nearly the same for all educational groups; the difference between the smallest and largest standard deviation is less than one point.

Appendix B
Characteristics of IERW Students

Comments:

The figures in Appendix B show selected characteristics of individuals who participated as students in the IERW training program during the period 1989-1995. The characteristics examined include education level, prior military experience, and FAST score. It should be noted that any individual who took the FAST test was considered an applicant even though it is known that some ROTC students and some Army Academy students who took the FAST had no serious intent to apply for entry into the flight training program. To illustrate changes over time the data are shown by year for the 7-year period between 1989 and 1995.

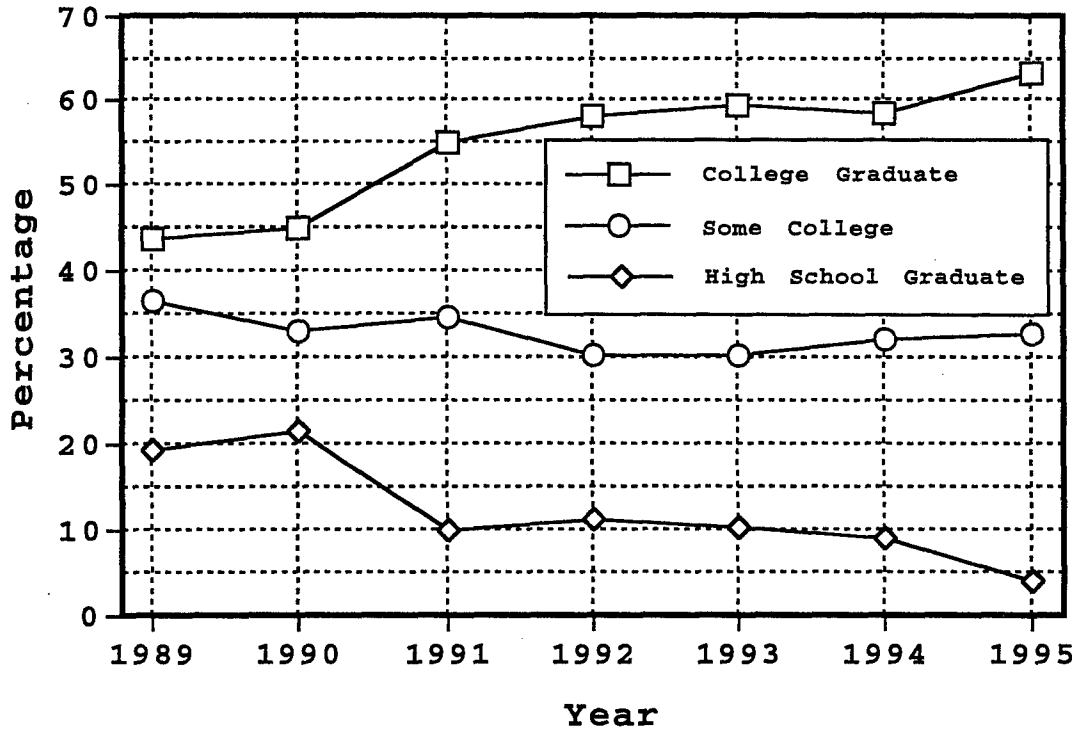


Figure B-1. Education level of IERW flight students as a function of year of entry.

Comment:

Between 1989 and 1995, college graduates accounted for a progressively larger percentage of the applicants who were selected for entry into the IERW training program. The percentage of college graduates increased from about 43% in 1989 to about 63% in 1995. At the same time, high school graduates accounted for a progressively smaller percentage of the applicants selected; the percentage decreased from about 20% in 1989 to about 4% in 1995. The percentage of applicants selected with some college remained about the same.

Comparison of the above data with the data in Figure A-1 shows that although only about 22% of 1995 applicants were college graduates, about 63% of the applicants selected that year were college graduates.

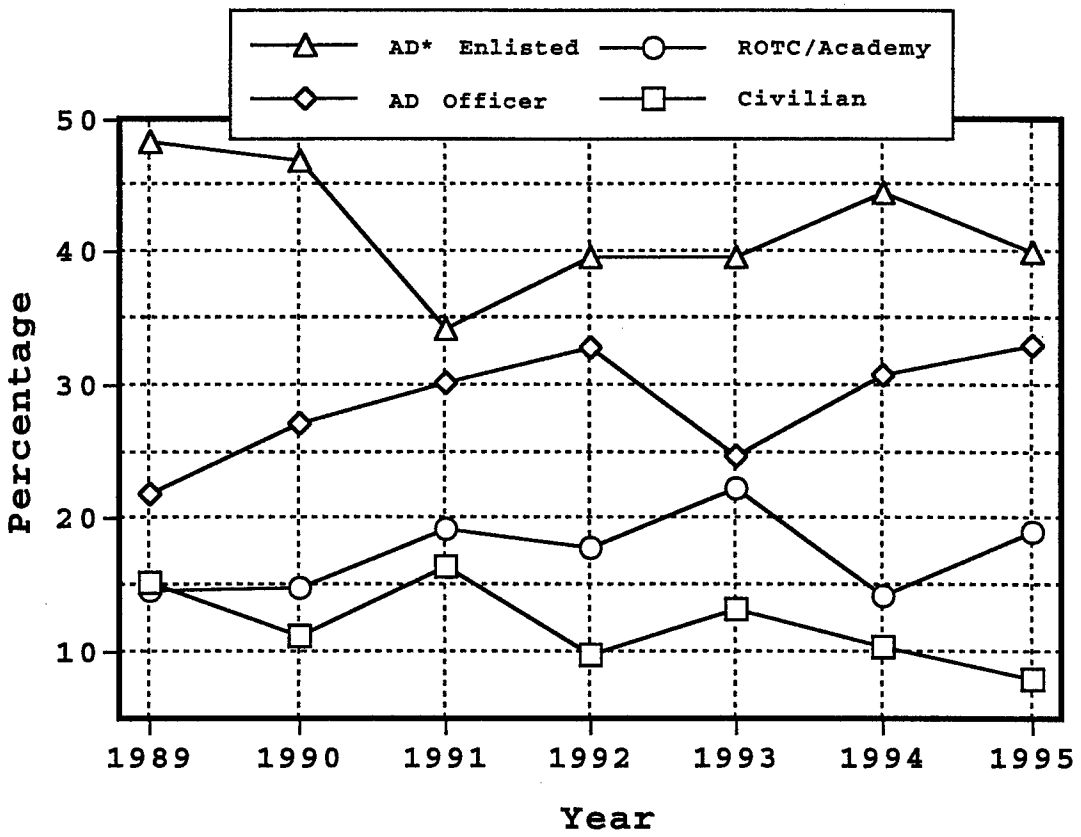


Figure B-2. Prior military experience of individuals who were selected for entry into IERW training during the period between 1989 and 1995.

Comments:

Most of the applicants selected for entry into IERW were on active duty at the time they were selected. Although the trends over time are not consistent, the relative percentage of active duty enlisted tended to decrease, and the relative percentage of active duty officers tended to increase during the period between 1989 and 1995.

The relative percentage of civilians selected decreased from about 15% in 1989 to about 6% in 1995. ROTC or Academy graduates accounted for between 15% and 23% of the applicants selected, depending on the year.

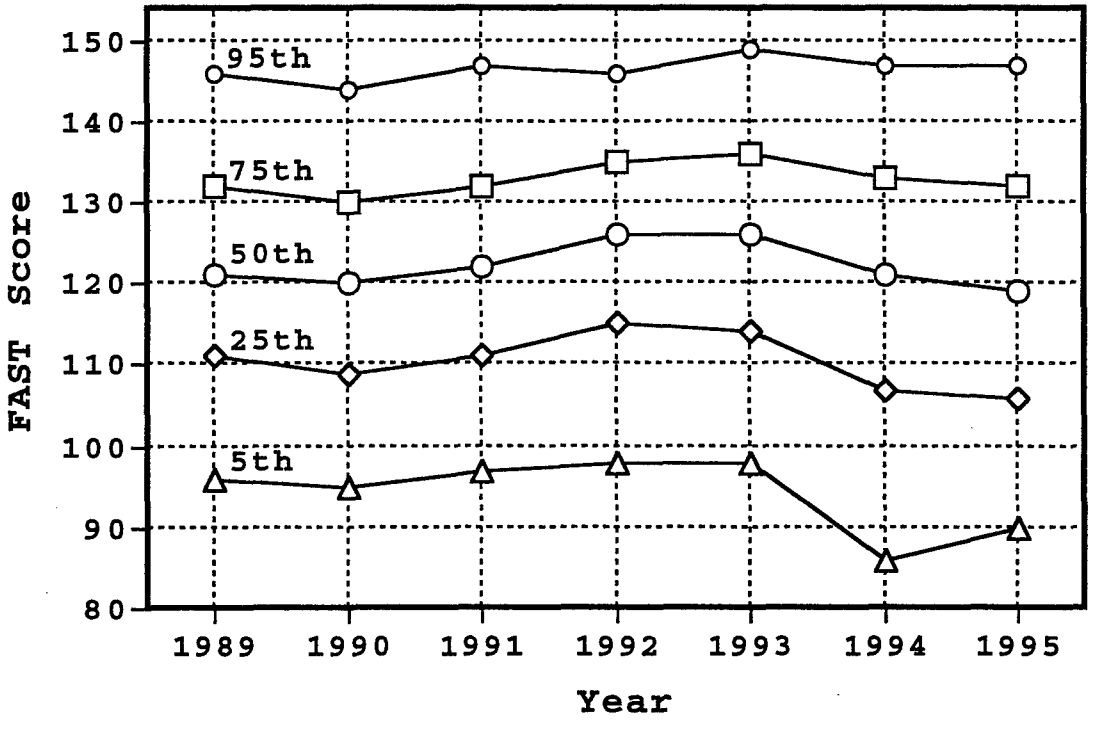


Figure B-3. Centiles of FAST scores for individuals who were selected for entry into the IERW training program during the period between 1989 and 1995.

Comments:

There has been little change in the distribution of FAST scores for the individuals selected for entry into IERW between 1989 and 1995. The only noteworthy change is the decrease in the 5th centile scores for 1994 and 1995. In 1994, the 5th centile was below the cut score of 90; the 5th centile was the same as the cut score in 1995. This indicates that 5% or more of the applicants selected in 1994 and 1995 had FAST scores below the cut score. Similarly, the 25th centile scores were lower in 1994 and 1995 than in the two prior years.

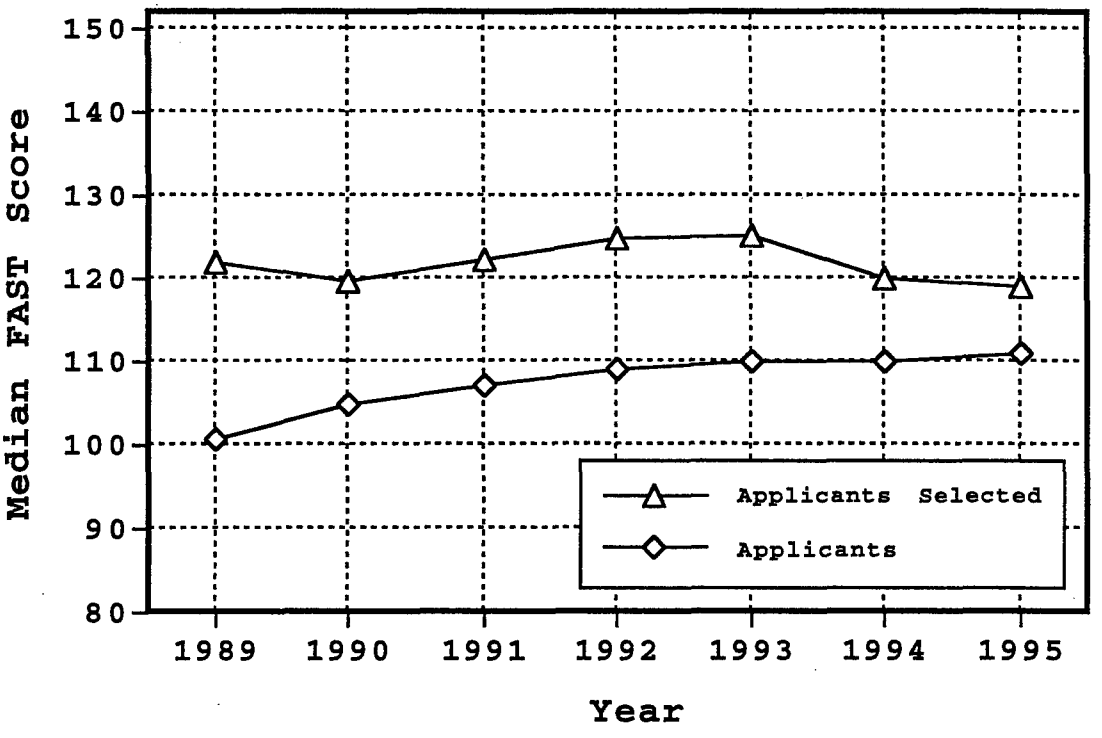


Figure B-4. Median FAST scores for all applicants and for the applicants who were selected for entry into the IERW training program during the period between 1989 and 1995.

Comments:

Between 1989 and 1995, the median FAST score of applicants increased consistently from about 101 to about 111. There was no corresponding increase in the FAST score of the applicants that were selected. Although the median FAST score of the applicants selected remained higher than the median score of the total applicant pool, this difference had decreased to less than 10% by 1995.

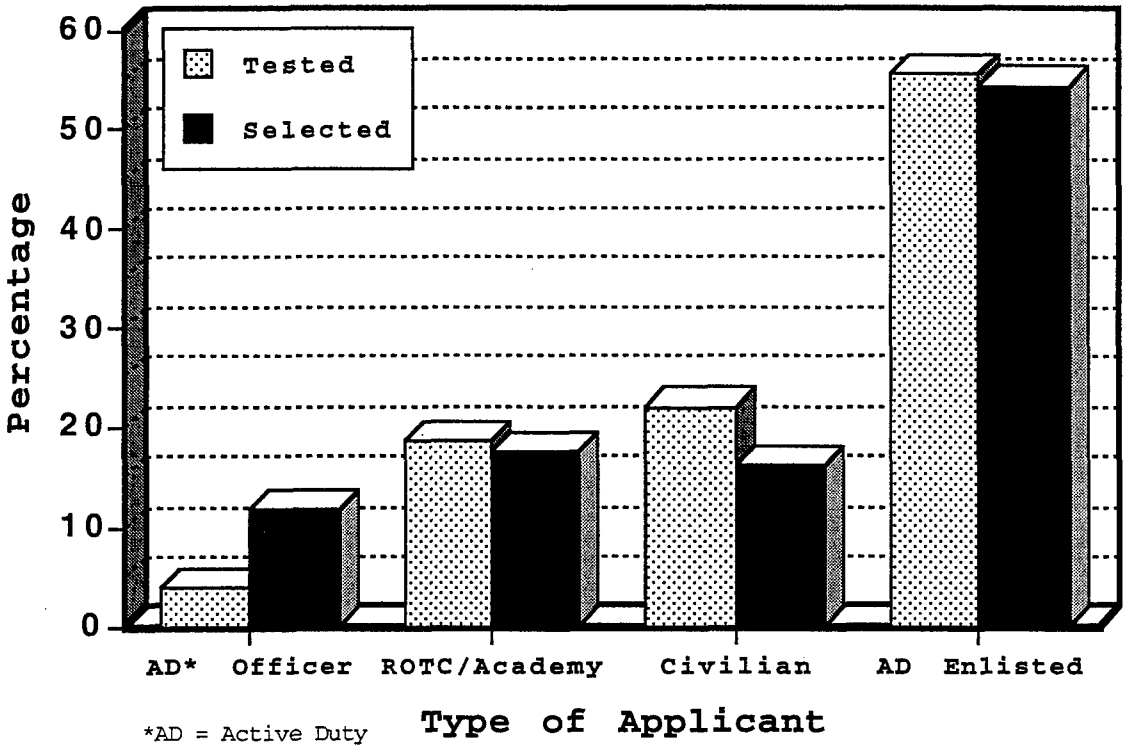


Figure B-5. Distribution of individuals tested and individuals selected for entry into the IERW training program as a function of prior military service at the time of testing.

Comments:

The distribution of individuals who were tested (FAST) is similar to the distribution of the individuals selected for entry into the IERW training program. Only two differences are noteworthy. First, proportionately more (about 8%) active duty officers were selected than were tested and, second, proportionately fewer (about 6%) civilians were selected than were tested. It should be noted that many ROTC and Academy students take the FAST even though they have no serious intention to apply for admission to the flight training program. For this reason, it is probable that proportionately more ROTC and Academy students are selected than actually apply for admission to flight training.

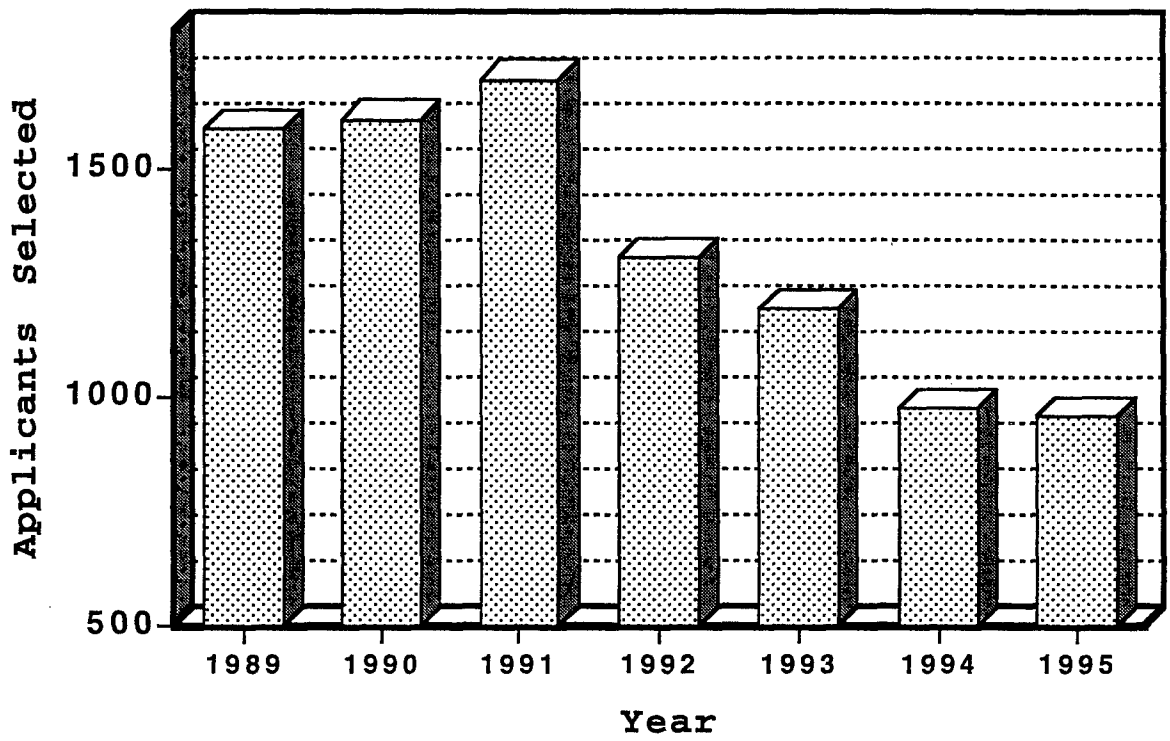


Figure B-6. IERW training program applicants selected by year during the period between 1989 and 1995.

Comments:

The number of applicants selected for entry into the IERW training program declined from a high of 1,696 in 1991 to a low of 958 in 1995. The number declined further, to 778, in 1996.

Appendix C
Number of Eliminations and Setbacks

Comments:

The figures in Appendix C show the number of individuals eliminated from flight training and the number of instances in which an individual was set back during training. The data shown in Appendix C tables are data that were reported by USAAVNC training officials during annual briefings. That is, all the figures in this appendix are based on data compiled from briefing charts that were retrieved from the USAAVNC files. The frequencies represent the combined number (eliminations or setbacks) that occurred during IERW training and during AQC training. All tables show frequencies by year for the 7-year period between 1989 and 1995.

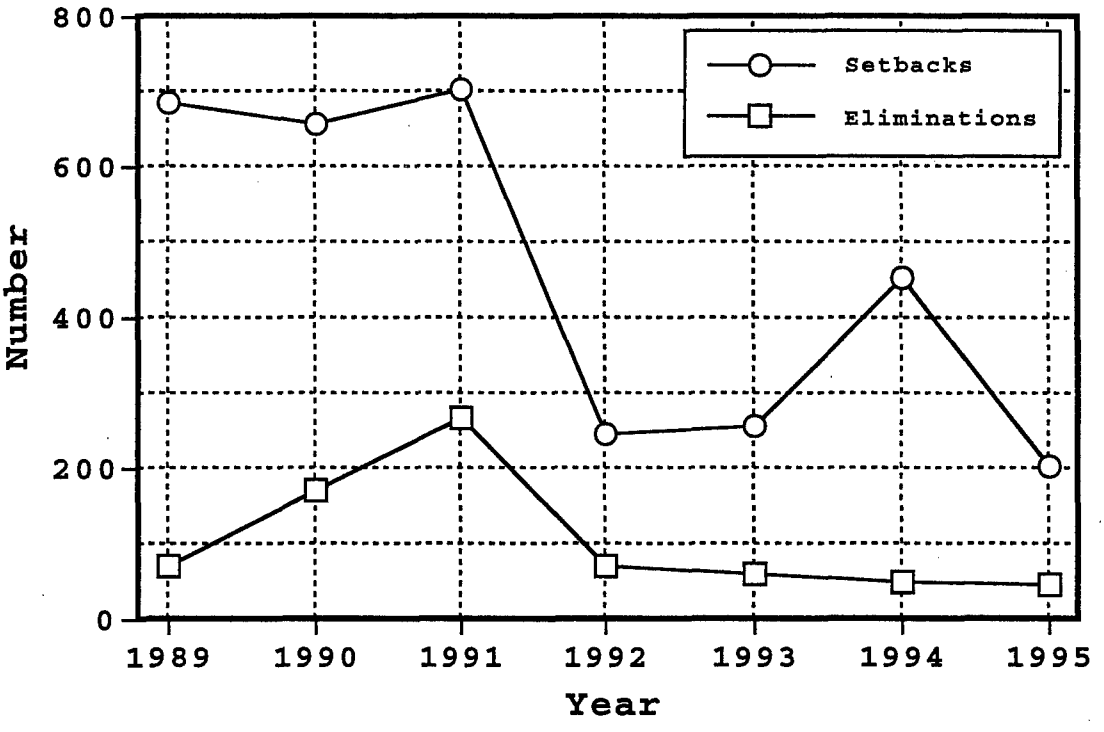


Figure C-1. Yearly eliminations and setbacks reported by the USAAVNC during the period between 1989 and 1995.

Comments:

The data presented above include all eliminations and setbacks, regardless of cause. Some of the eliminations and setbacks are due to flight deficiencies and others are due to administrative problems.

The reasons for the dramatic decrease in setbacks in 1992 is not known for certain. It has been suggested that this decrease in setbacks was due to the temporary introduction of a one-setback rule, which stipulates that a flight student is permitted only one flight deficiency setback before elimination. If this was the only factor in operation, it would be expected that eliminations would increase in number as setbacks decreased in number. This was not the case.

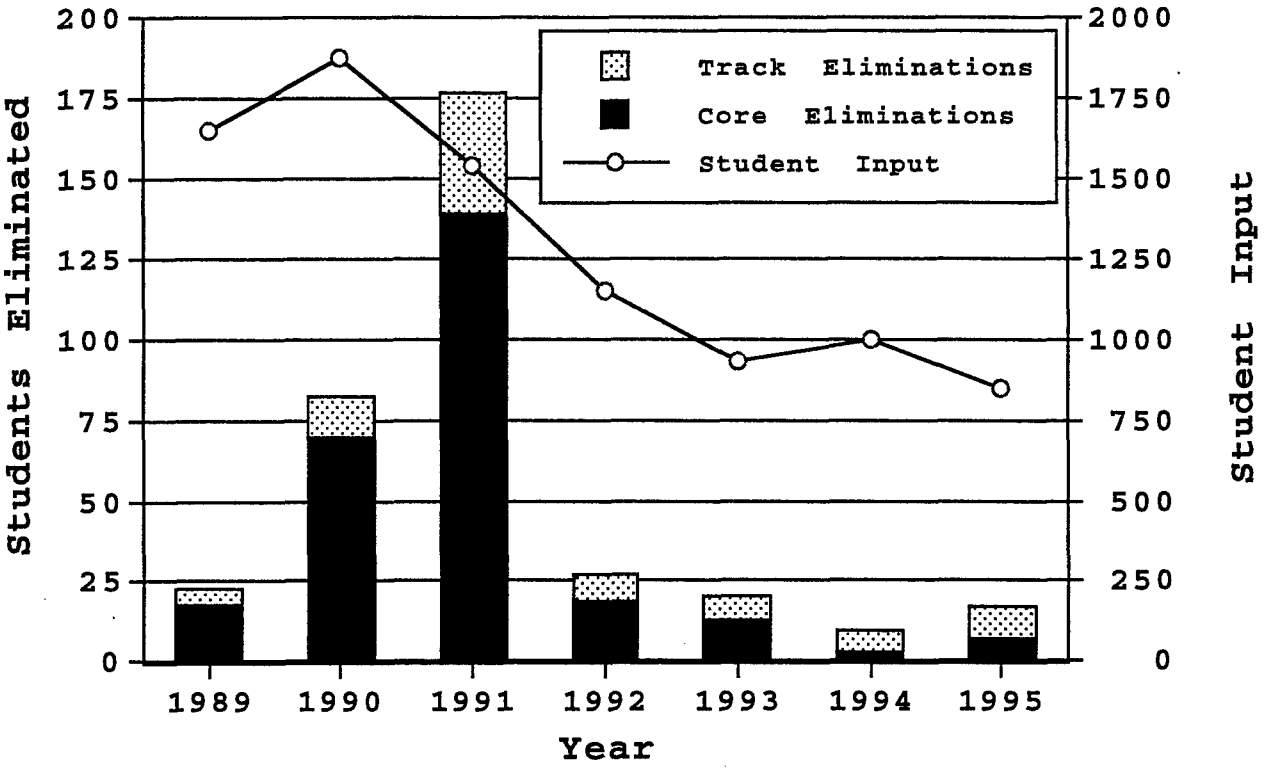


Figure C-2. Eliminations due to flight deficiencies as a function of year and training phase in which elimination occurred. Based on data reported by USAAVNC.

Comments:

The number of flight eliminations was far larger in 1990 (82) and 1991(177) than in all other years(27 or fewer). It has been suggested that the large number of flight deficiency eliminations in 1990 and 1991 was due to the temporary adoption of the one setback rule (each student is permitted only one flight deficiency setback before elimination). However, it is probable that the requirement to downsize the Army aviator population also contributed to the large number of flight deficiency eliminations in 1990 and 1991.

It is interesting to note that the dramatic changes in flight deficiency eliminations in 1990 and 1991 were not accompanied by large changes in student input.

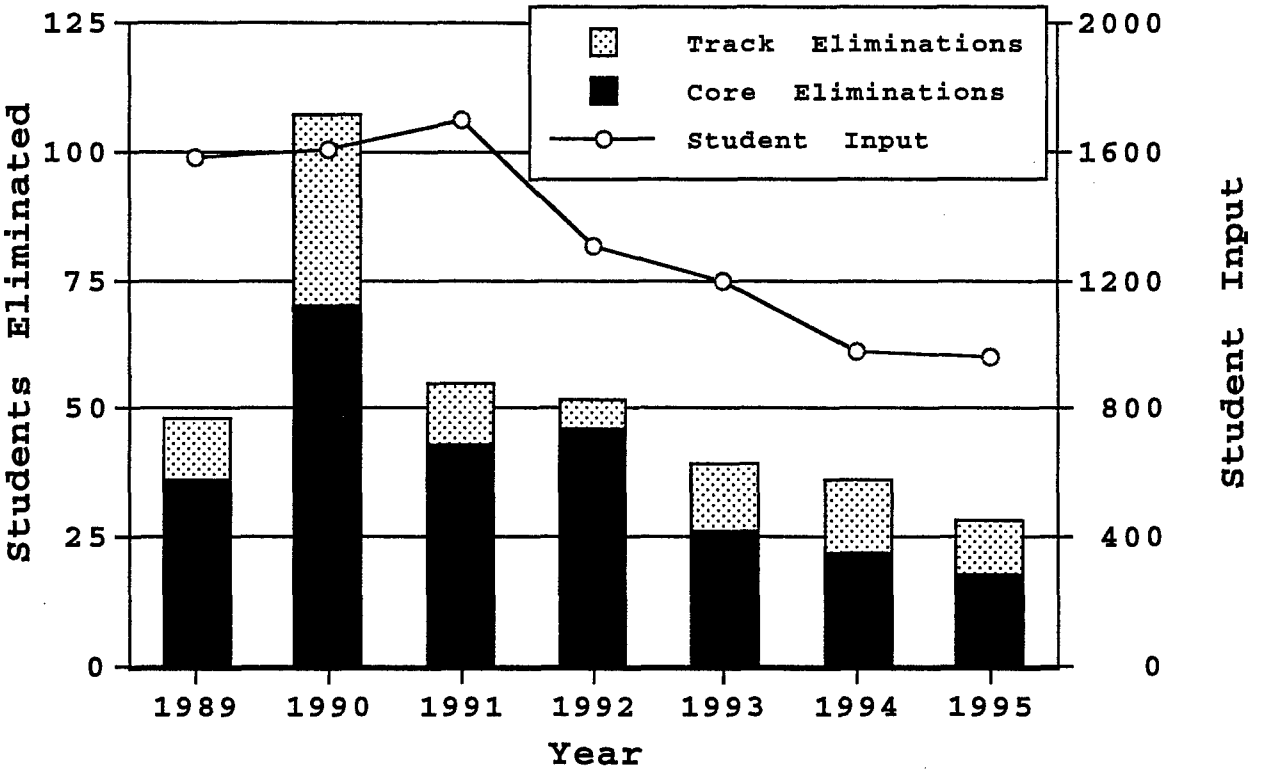


Figure C-3. Eliminations due to administrative problems as a function of year and training phase in which eliminations occurred. Based on data reported by USAAVNC.

Comments:

The number of administrative eliminations was far higher in 1990 (107) than in any other year. It is interesting to note that, in 1991, the number of administrative eliminations declined at the same time that the number of flight deficiency eliminations increased to its highest level.

For the 4 years following 1991, the number of administrative eliminations was positively related to student input.

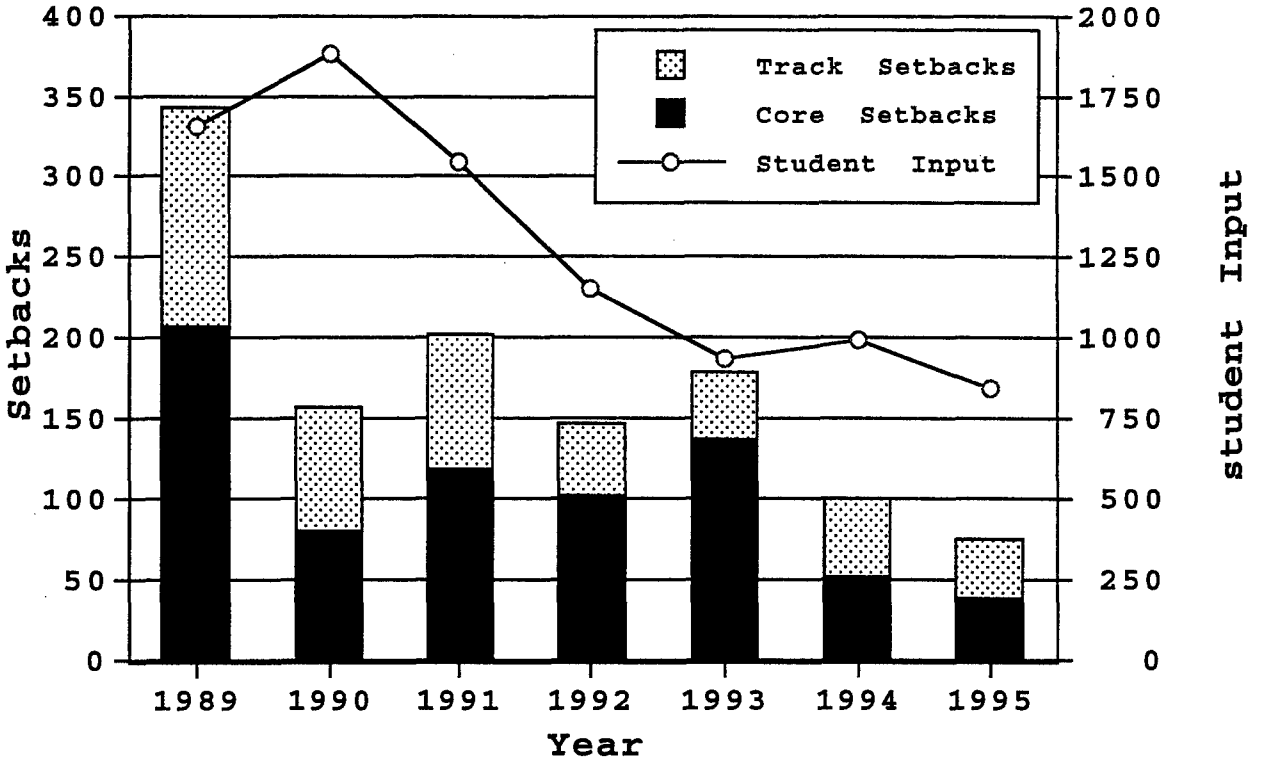


Figure C-4. Setbacks due to flight deficiencies as a function of year and training phase in which setbacks occurred. Based on data reported by USAAVNC.

Comments:

Flight deficiencies were far higher (342) in 1989 than in any following year (202 or fewer). The large number of flight deficiency setbacks in 1989 may have led to the temporary adoption of the one setback rule in 1990. These findings (increased flight deficiency eliminations and decrease flight deficiency setbacks in 1990 and 1991) are the results that would be expected from the introduction of a one setback rule.

It is noteworthy that the number of flight deficiency setbacks is not closely related to student input.

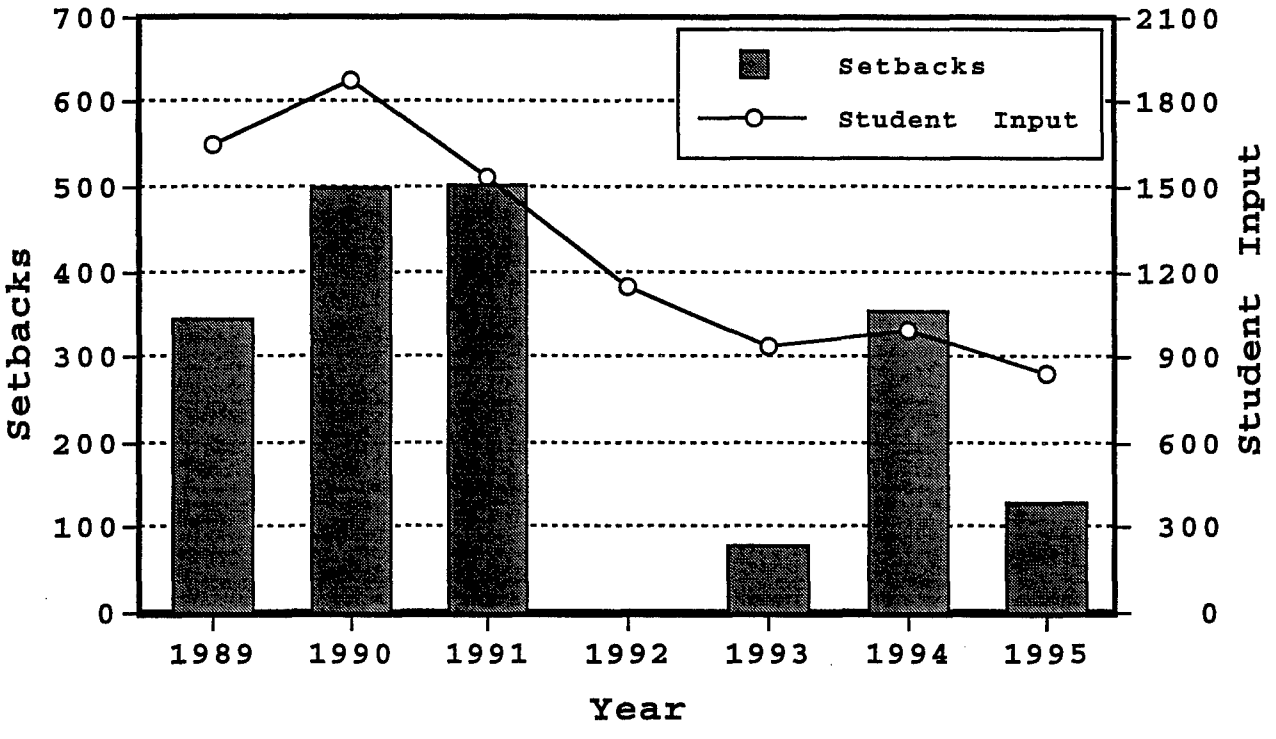


Figure C-5. Setbacks due to administrative problems as a function of year. Based on data reported by USAAVNC. Valid data for 1992 and 1993 are not available.

Comments:

The data reported by the USAAVNC did not contain the number of administrative setbacks for 1992. Moreover, the number of administrative setbacks reported for 1993 are suspect. For these reasons, it is not possible to comment about trends in administrative setbacks using the data reported by the USAAVNC. It can only be said that the number of administrative setbacks is at least as large as is shown in Figure C-5.

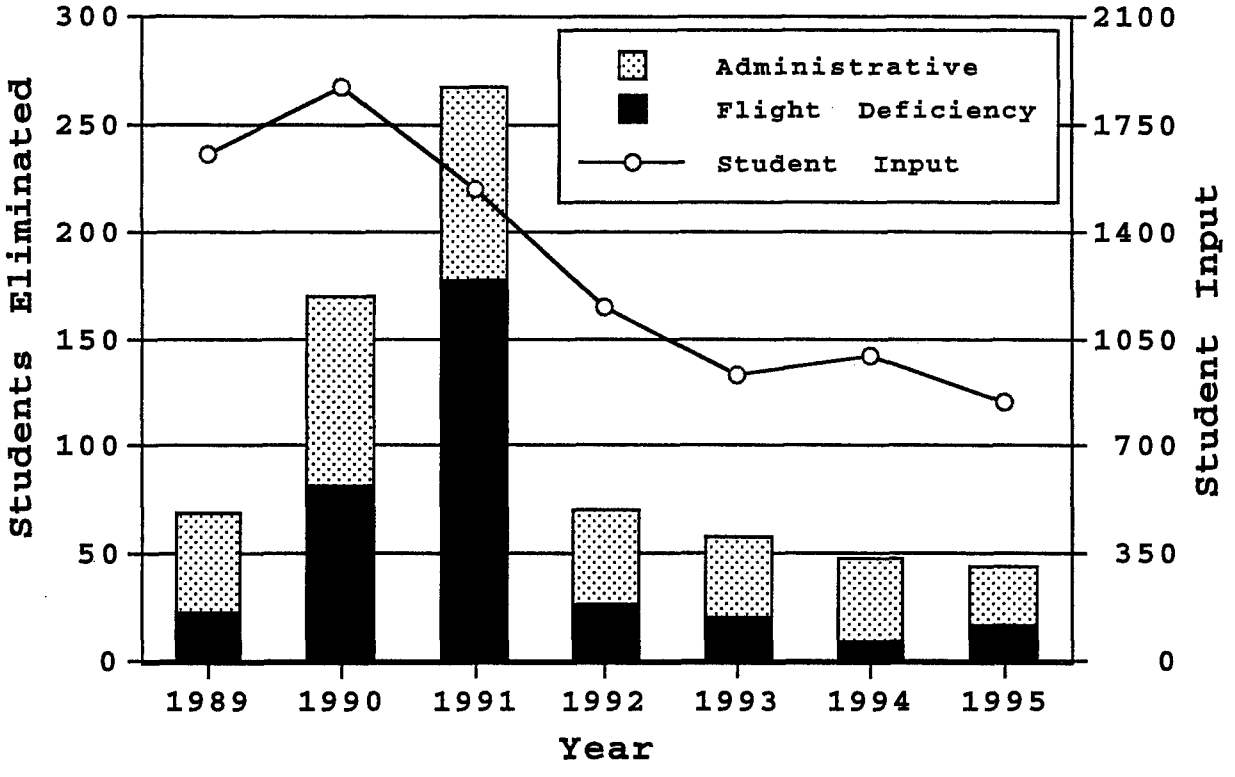


Figure C-6. Eliminations as a function of year and cause (flight deficiency or administrative problem). Based on data reported by USAAVNC.

Comments:

Figure C-6 shows the relationship between flight deficiency eliminations and administrative eliminations during the period between 1989 and 1995. Except in 1991 and 1992, the proportion of administrative eliminations was far higher than the proportion of flight deficiency eliminations. The large absolute and relative number of administrative eliminations is surprising. It was this finding that led to a more comprehensive study of the causes of administrative eliminations. The results of the study of causes of eliminations and setbacks are presented elsewhere in this report.

Appendix D
Estimated Cost of Eliminations and Setbacks

Comments:

The first two figures in this appendix (D-1 and D-2) show the estimated cost of each phase of IERW training and the estimated cost of each AQC training program. These cost estimates were derived by the USAAVNC Directorate of Resource Management (DRM) using 1996 cost data.

The remaining figures in Appendix D show estimates of the annual dollar cost of eliminations and setbacks. Cost data are shown for flight deficiency eliminations and setbacks and for administrative eliminations and setbacks.

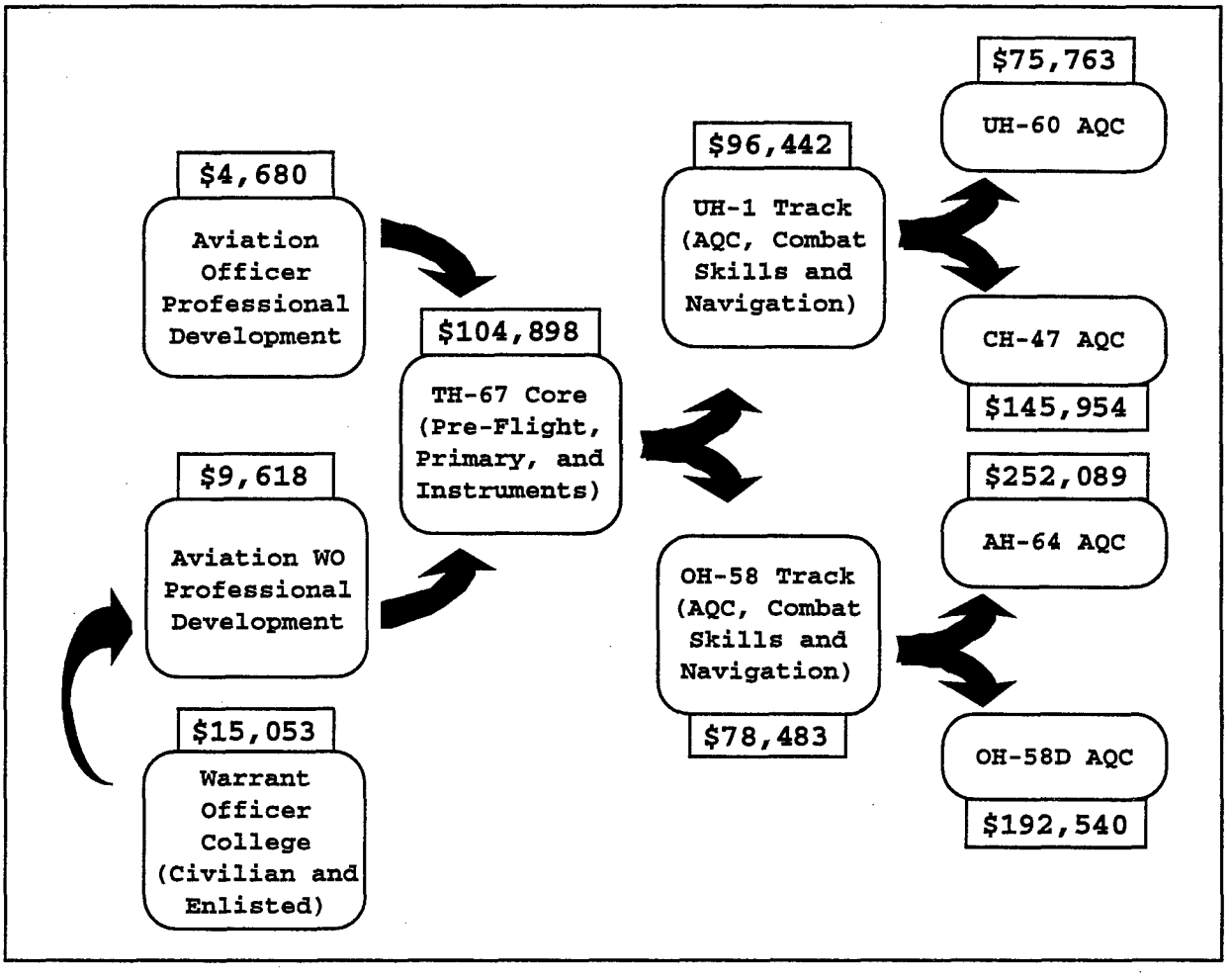


Figure D-1. Estimated cost of Army aviator training for the dual-track program. Cost included pre-flight training, IERW training, and AQC training. Cost estimates were calculated by the USAAVNC DRM.

Comments:

The above data were used to estimate the dollar costs of eliminations and setbacks. These data show the enormous costs of eliminations, particularly those that occur late in training.

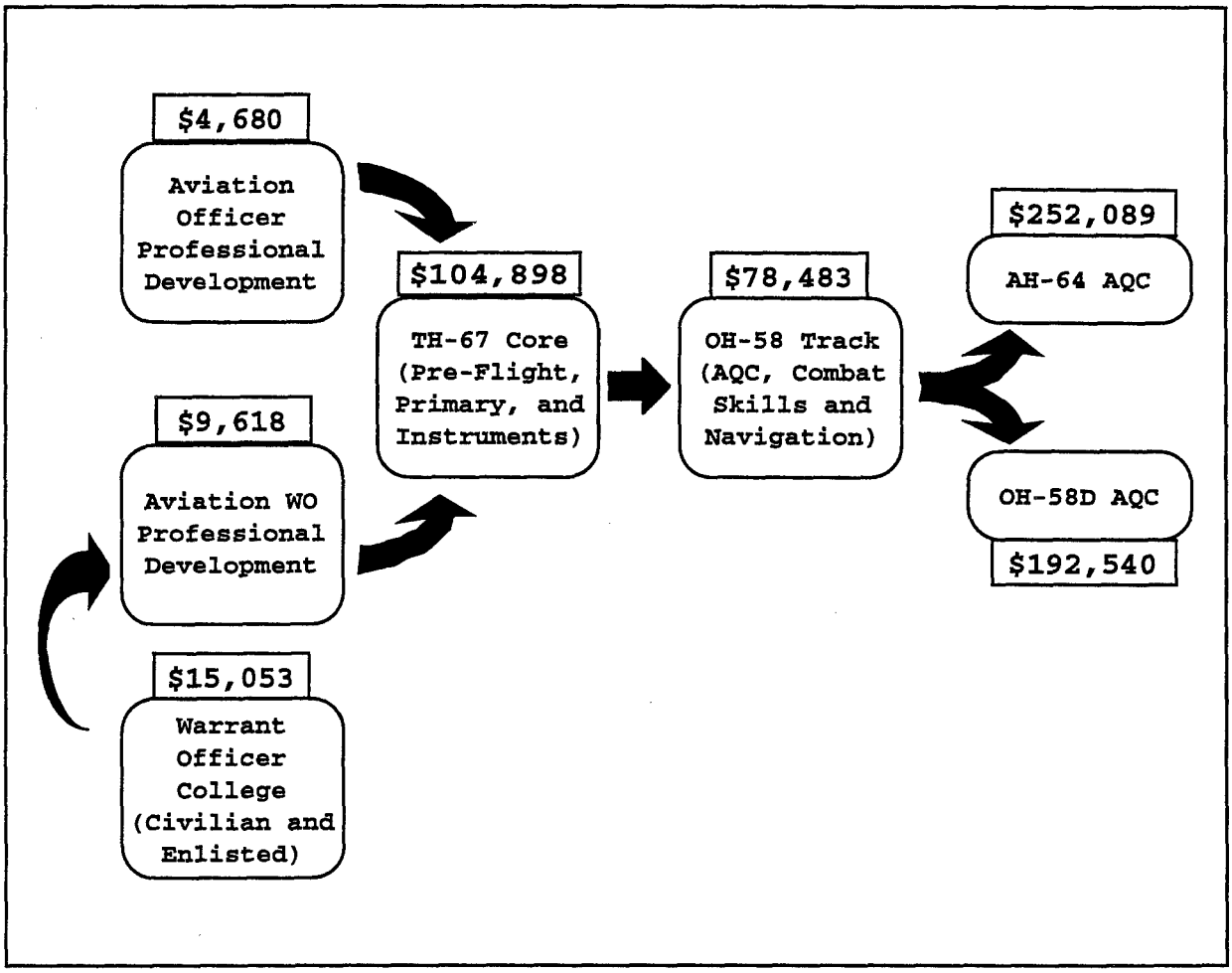


Figure D-2. Estimated cost of Army aviator training for the single-track program. Cost included pre-flight training, IERW training, and AQC training. Cost estimates were calculated by the USAAVNC DRM.

Comments:

The above data were used to estimate the dollar costs of eliminations and setbacks. These data show the enormous costs of eliminations, particularly those that occur late in training.

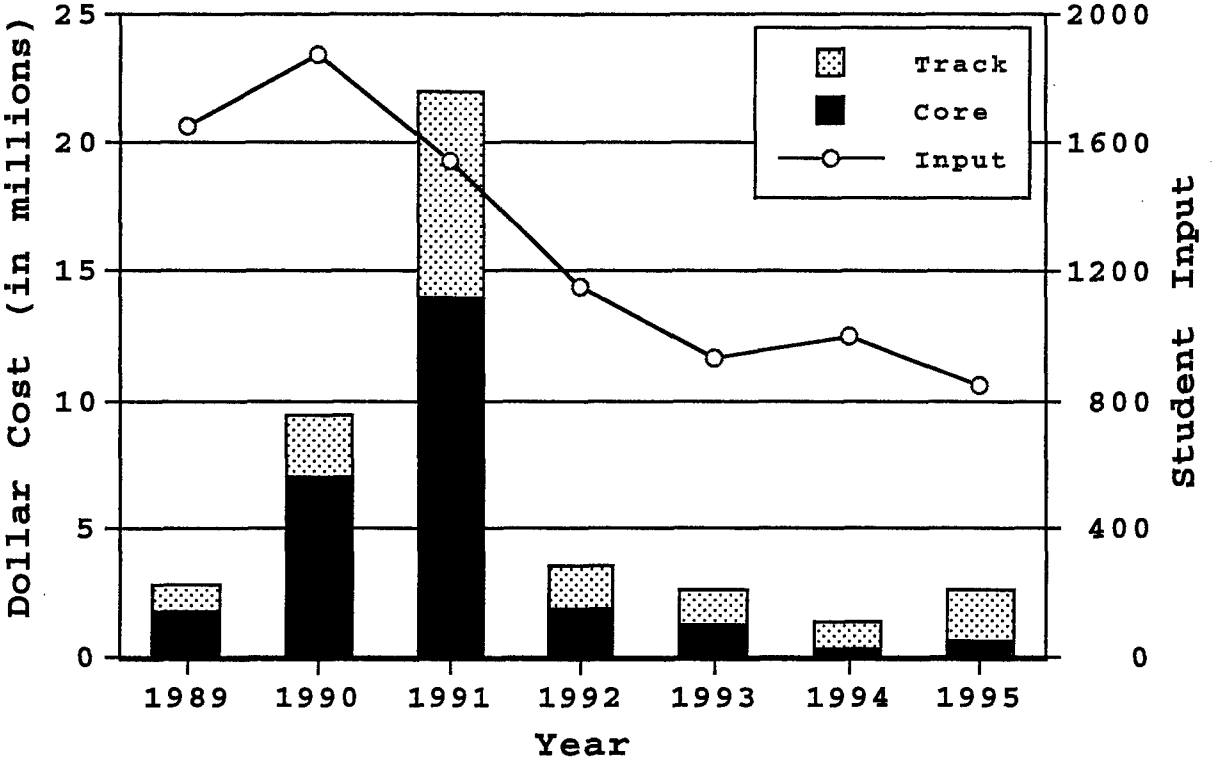


Figure D-3. Estimated cost of flight deficiency eliminations by year and training phase in which elimination occurred. Based on elimination data and cost data reported by USAAVNC.

Comments:

The cost data shown in Figures D-1 and D-2 and the elimination data shown in Figure C-2 were used to estimate the dollar cost of flight deficiency eliminations. The cost of an elimination was estimated by adding one-half the cost of the training phase in which the student was eliminated to the full cost of all training phases completed successfully. This estimate is conservative for three reasons. First, the estimated costs do not include the cost of the setbacks that occurred prior to elimination. Second, it is probable that the mean cost exceeds one-half of the cost of the training phase in which the student was eliminated. Third, as is discussed later, there is compelling evidence that the true number of flight deficiency eliminations exceeds the number reported by USAAVNC.

These data clearly illustrate the enormous dollar costs of eliminations in 1990 (about $10 million dollars) and 1991 (about $22 million). These data also show the enormous savings that would be realized if flight deficiency eliminees could be identified during the core phase of training rather than later in the track phase of training.

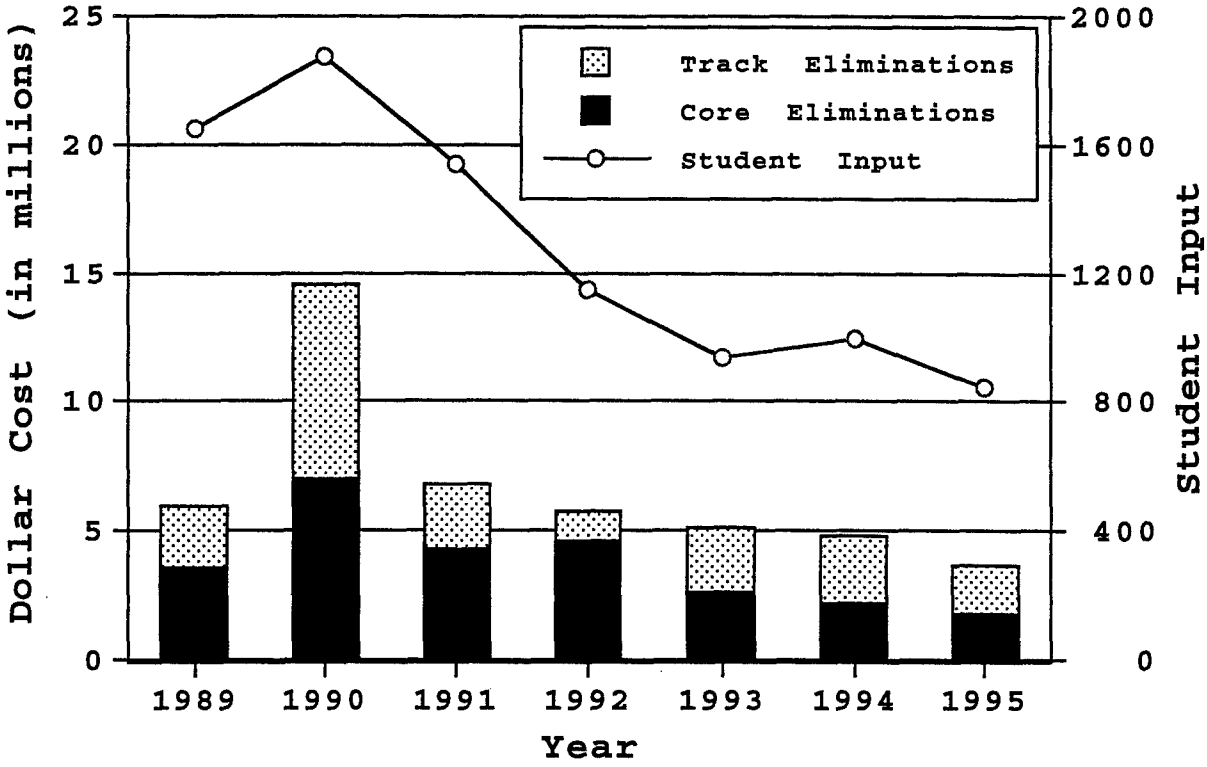


Figure D-4. Estimated cost of administrative eliminations by year and training phase in which eliminations occurred. Based on elimination data and cost data reported by USAAVNC.

Comments:

The cost data shown in Figures D-1 and D-2 and the elimination data shown in Figure C-3 were used to estimate the dollar cost of flight deficiency eliminations. The cost of an elimination was estimated by adding one-half the cost of the training phase in which the student was eliminated to the full cost of all training phases completed successfully. This estimate is conservative for two reasons. First, the estimated costs do not include the cost of the setbacks that occurred prior to elimination. Second, it is probable that the mean cost exceeds one-half of the cost of the training phase in which the student was eliminated. However, the cost of administrative eliminations is overestimated to the extent that a flight deficiency was the true cause of an administrative elimination.

After the peak in 1990 (nearly $15 million), the cost of administrative eliminations declined to a low of about $3.5 million in 1995.

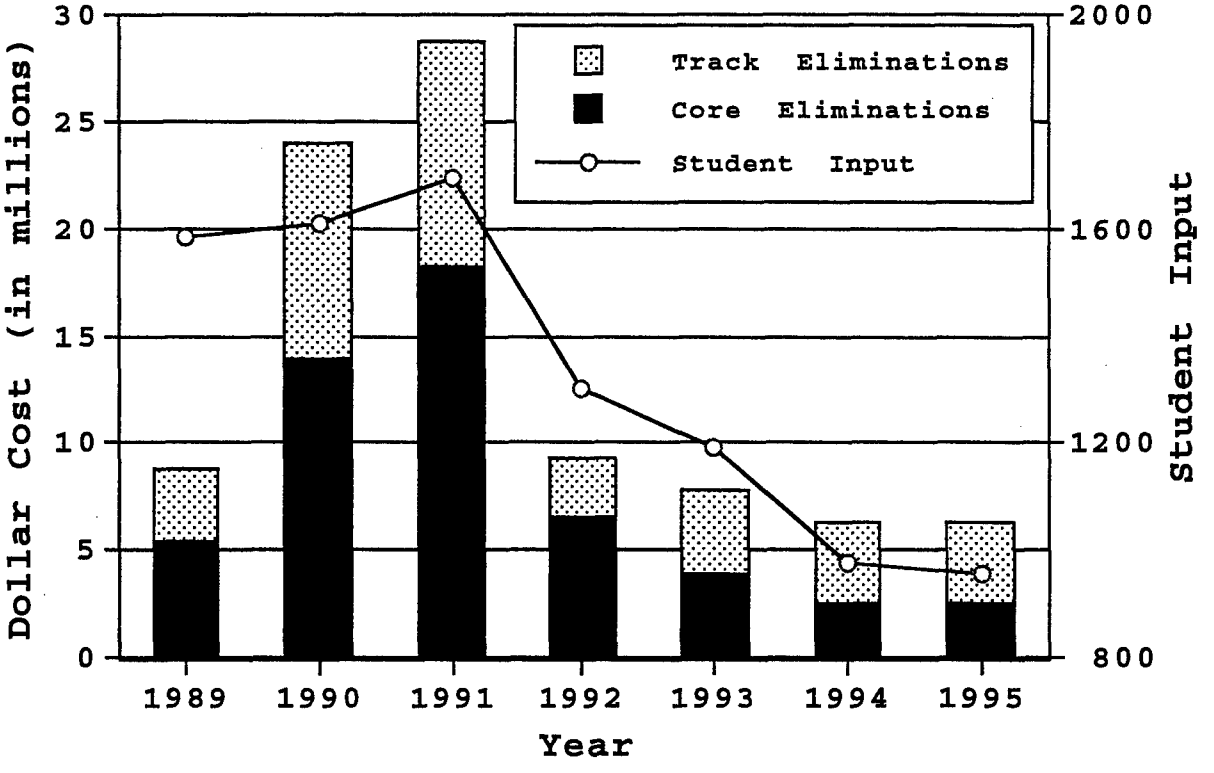


Figure D-5. Estimated cost of all eliminations by year and training phase in which eliminations occurred. Based on elimination data and cost data reported by USAAVNC.

Comments:

The cost data shown in Figure D-5 represent the combined cost of flight deficiency eliminations (Figure D-3) and administrative eliminations (Figure D-4).

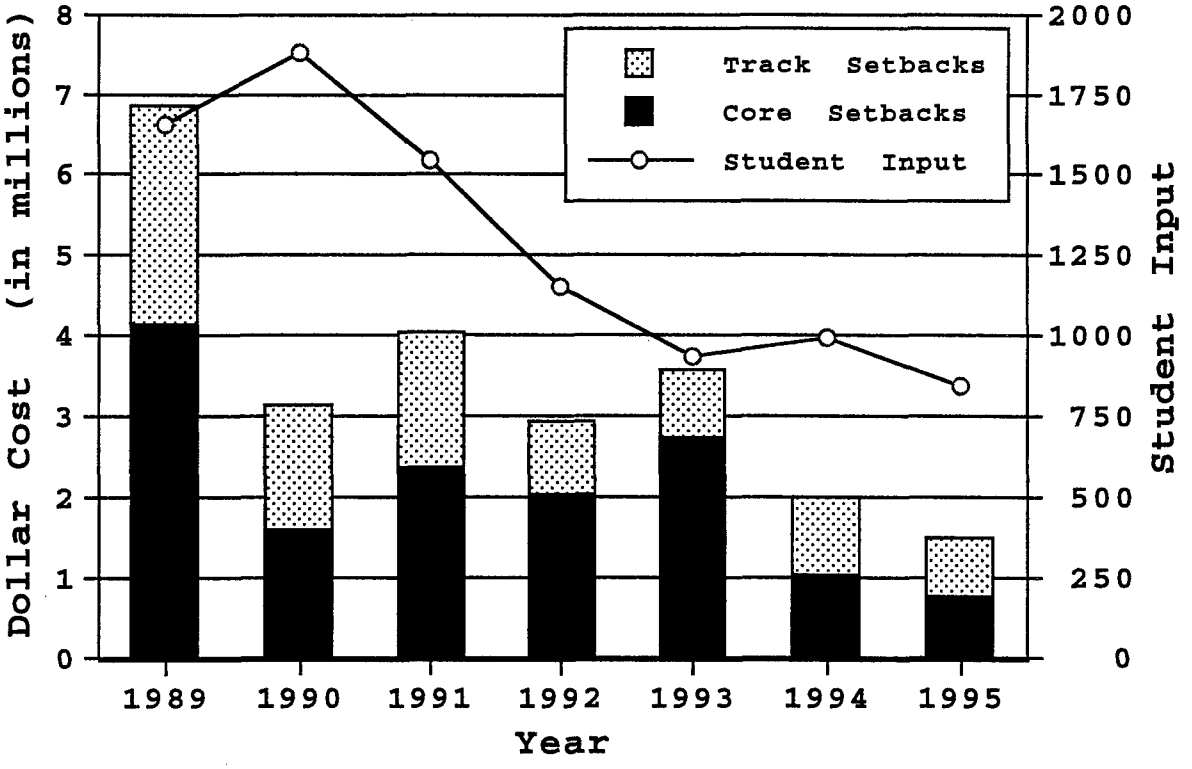


Figure D-6. Estimated cost of flight deficiency setbacks by year and training phase in which the setbacks occurred. Based on elimination data and cost data reported by USAAVNC.

Comments:

The costs presented above are based on an estimated average cost of $20,000 per setback. The average cost per setback was derived from a study of the number of additional hours of flight hours received per setback and the associated cost of student remuneration, instructor pilot remuneration, and aircraft costs. The cost estimates do not include the additional administrative costs associated with setbacks.

In 1989, the annual cost of flight deficiency setbacks ($6.8 million) exceeded the cost of flight deficiency eliminations ($2.8 million). For all other years, however,the annual cost of flight deficiency setbacks is far less than the annual cost of flight deficiency eliminations.

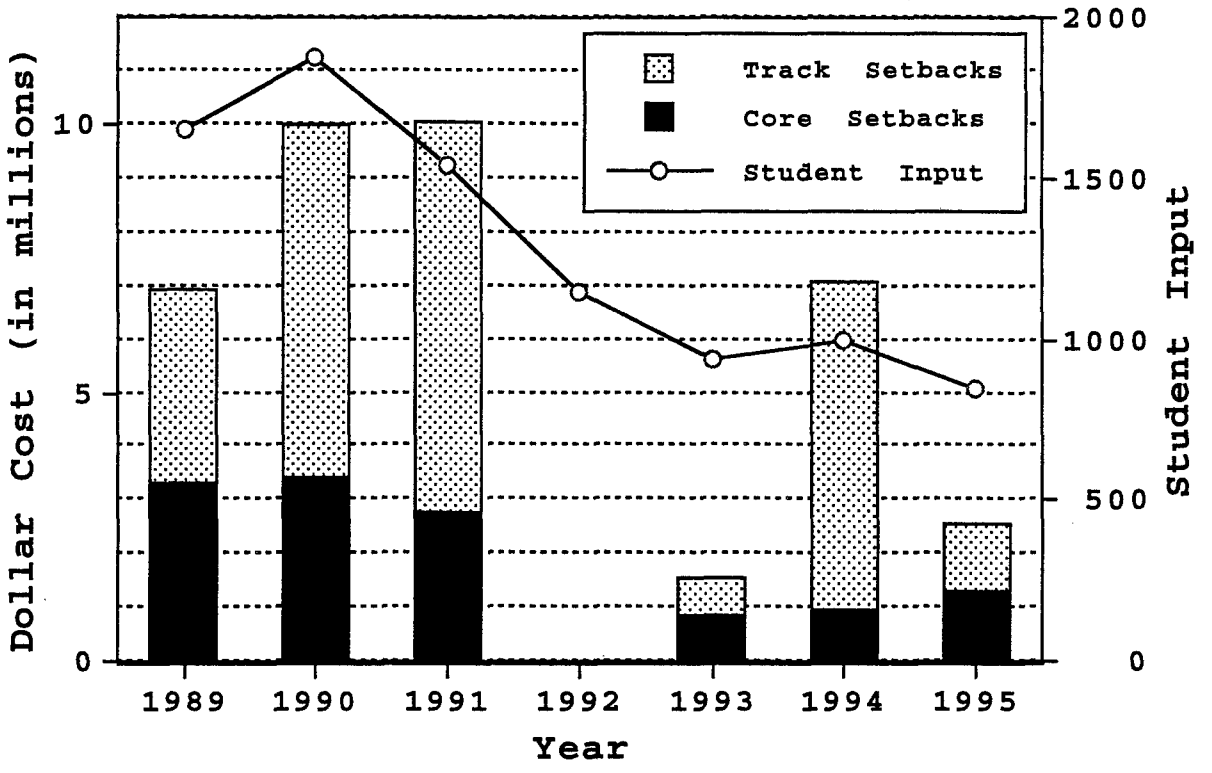


Figure D-7. Estimated cost of setbacks due to administrative problems as a function of year and training phase during which the setbacks occurred. Based on setback data and cost data reported by USAAVNC. Valid data for 1992 and 1993 are not available.

Comments:

The data reported by the USAAVNC did not contain the number of administrative setbacks for 1992. Moreover, the number of administrative setbacks reported for 1993 are suspect. For these reasons, it is not possible to comment about trends in the number or cost of administrative setbacks using the data reported by the USAAVNC. It can only be said that the cost of administrative setbacks is at least as large as is shown in Figure C-5.

For the years in which valid data are available (all years except 1992 and 1993), the cost of track setbacks is far larger than the cost of core setbacks. Because the estimated cost of all setbacks is the same, this difference is due solely to the smaller number of core setbacks.

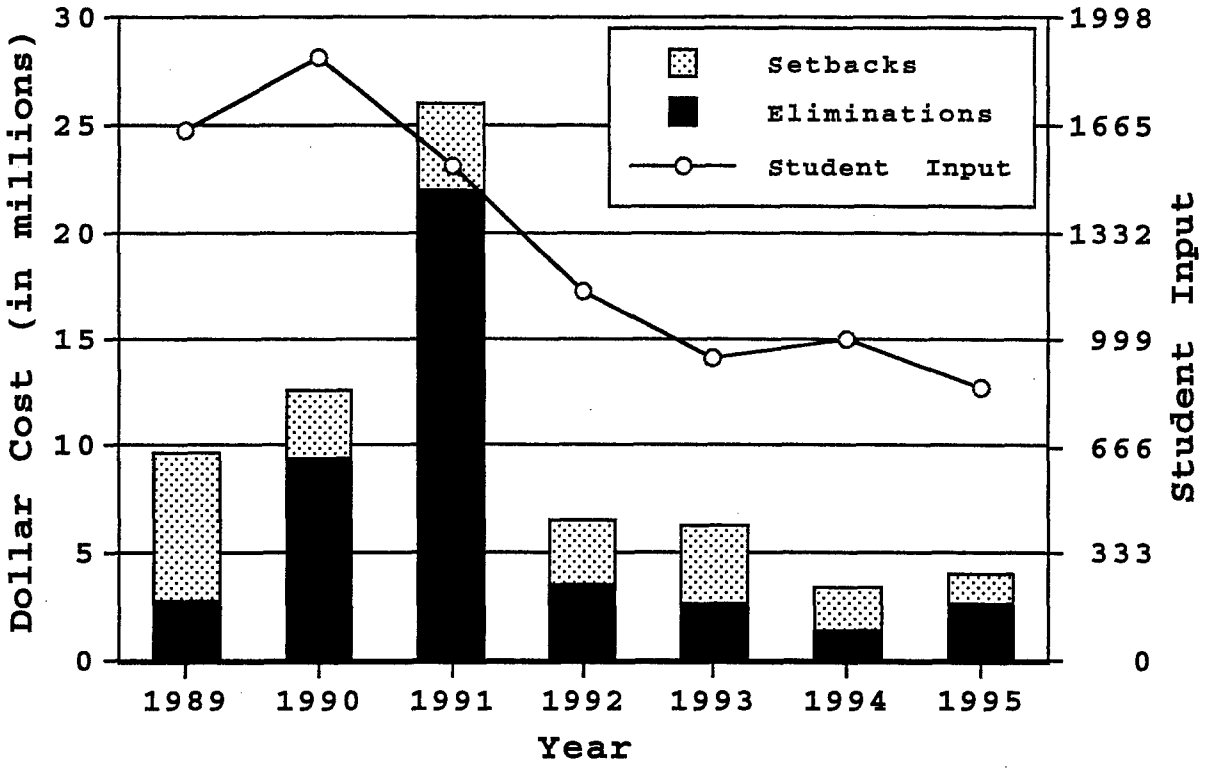


Figure D-8. Estimated cost of flight deficiency eliminations and setbacks by year. Based on frequency and cost data reported by USAAVNC.

Comments:

Figure D-8 shows the combined costs of flight deficiency eliminations and flight deficiency setbacks. It is noteworthy that the relative cost of flight deficiency eliminations and flight deficiency setbacks varies greatly from year to year. The relative cost of eliminations was higher than setbacks in 1990, 1991, and 1995 but was lower than setbacks in 1989, 1992, 1993, and 1994.

Although the combined cost of flight deficiency eliminations and setbacks was very high in 1991 ($25.9 million), the combined cost was only $3.4 million and $4.1 million in 1994 and 1995, respectively.

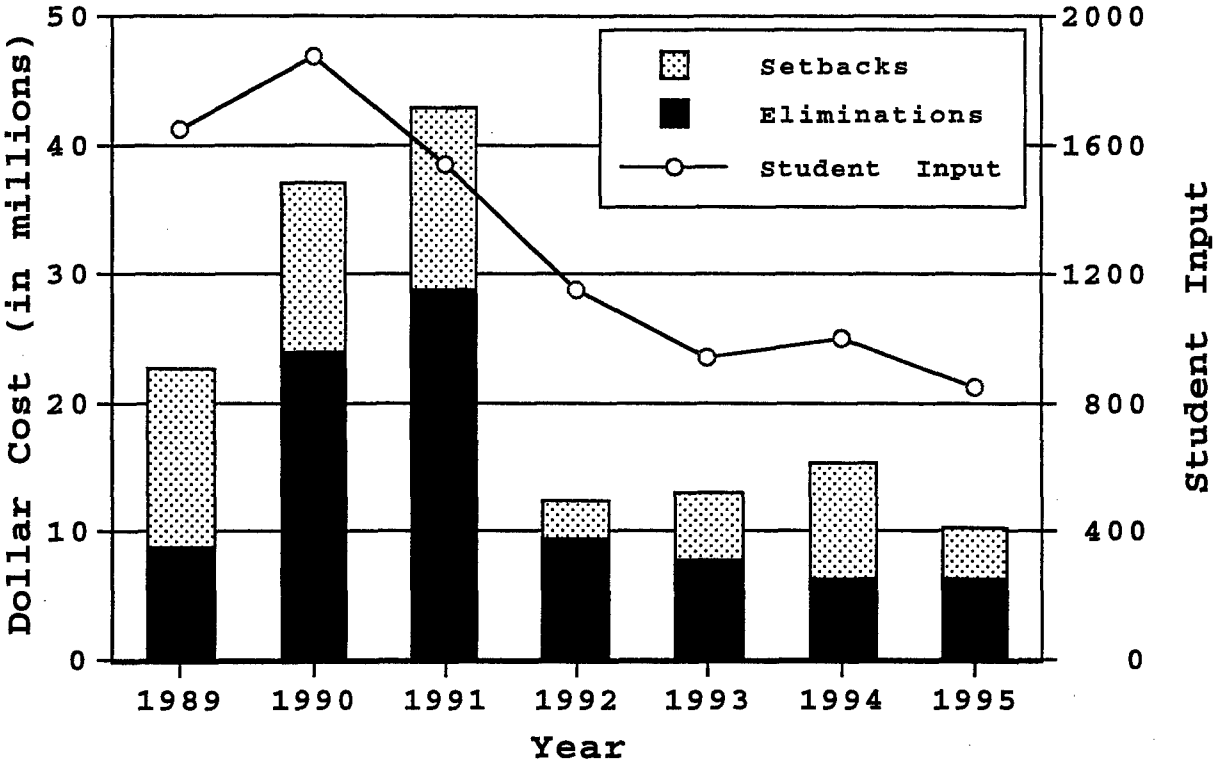


Figure D-9. Estimated cost of all eliminations and all setbacks by year. Based on frequency and cost data provided by USAAVNC. Valid data for administrative setbacks are not available for 1991 and 1992.

Comments:

The estimated cost of all eliminations and setbacks increased from $22.6 million in 1989 to $42.8 million in 1991. Thereafter, the cost decreased dramatically to a value between $15.4 million (1994) and $10.4 million (1995). However, as stated earlier, the estimated cost of setbacks is severely underestimated for 1992 and 1993 because of the lack of valid data on the number of administrative setbacks that occurred during 1992 and 1993.

Appendix E
Size and Composition of Databases

Comments:

The four figures in Appendix E show the size and composition of the databases created for use in analyzing (a) the types and frequencies of the causes cited for eliminations and setbacks, and (b) the analysis of the effect of increasing the FAST cut-score. The databases were compiled from the weekly training events reports distributed weekly by the USAAVNC.

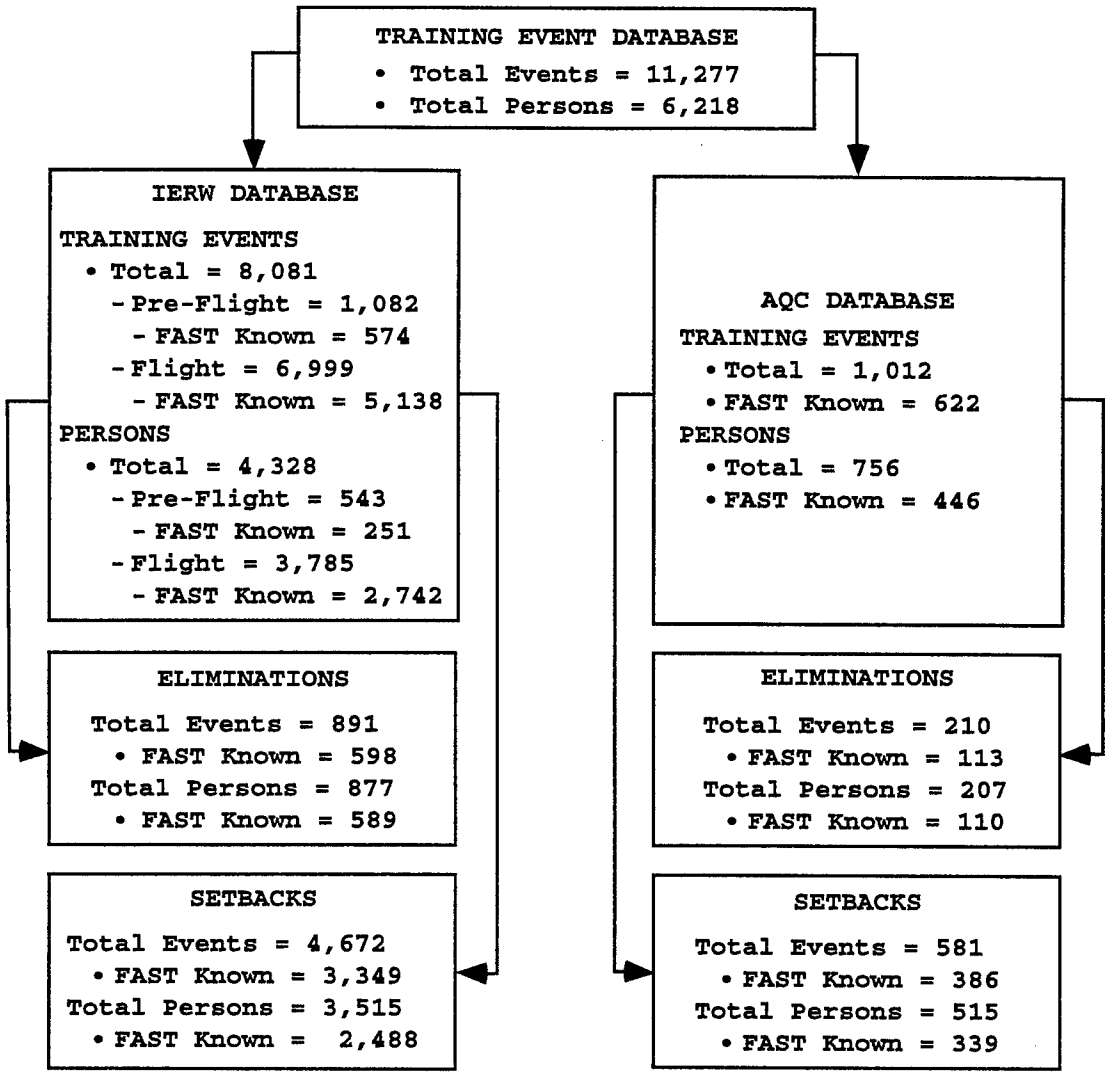


Figure E-1. Illustration of the size and composition of the Training Event Database.

Comments:

The training vvent database included 1,384 training events that occurred in training courses other than the IERW training or AQC training. Examples of such courses include the instructor pilot course, the maintenance test pilot course, and the instrument flight examiner course. Training events that occurred during training courses other than IERW and AQC were not analyzed.

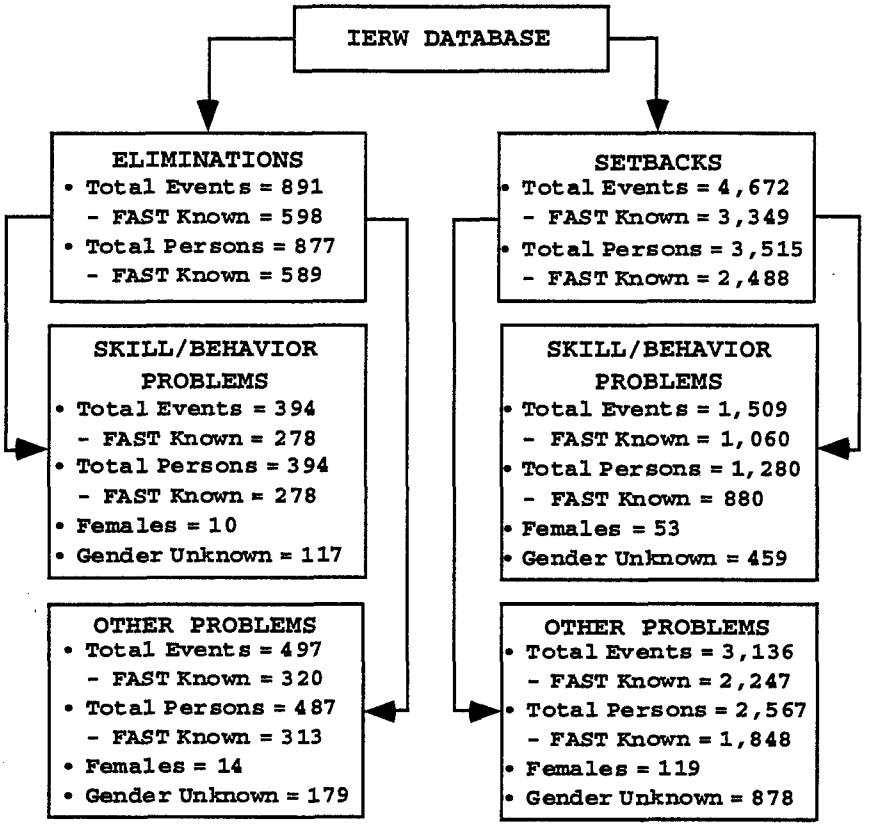


Figure E-2. Illustration of the size and composition of the IERW training event database.

Comments:

The IERW database contained 891 eliminations and 4,672 setbacks. There were 877 persons who were eliminated and 3,515 who had one or more setbacks. This means that 13 persons were found who were eliminated twice and that numerous persons had 2 or more setbacks. FAST scores were located for 67% of the eliminees and 71% of the individuals with one or more setbacks. Forty-two percent of the eliminees were eliminated because of a skill deficiency or a behavior problem (improper conduct); the remaining 59% were eliminated because of other problems (medical, IP shortage, etc.). Thirty-two percent of the setbacks were due to skill or behavior problems; the remaining 68% were due to other problems. Gender was unknown for 34% of the eliminees and 38% of the individuals with one or more setbacks. The number of known females was small for all four subsamples.

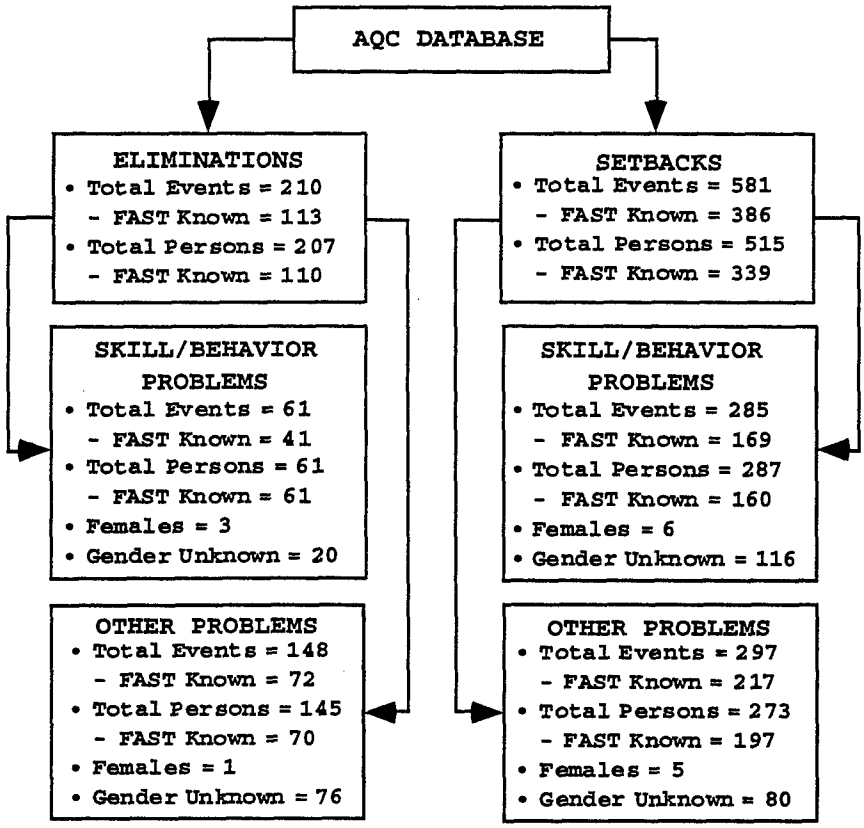
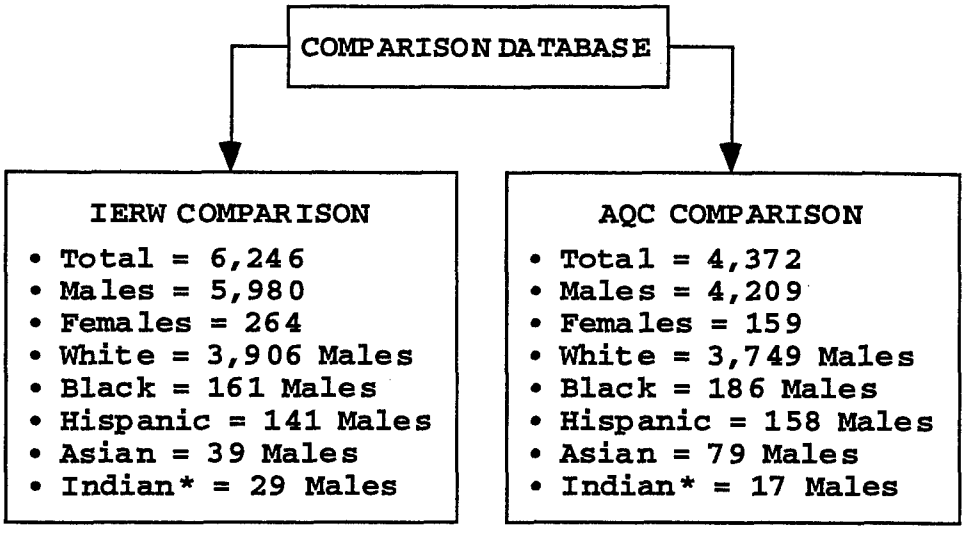


Figure E-3. Illustration of the size and composition of the AQC training event database.

Comments:

The AQC database contained 210 eliminations and 581 setbacks. There were 207 persons who were eliminated and 515 who had one or more setbacks. This means that 3 persons were found who were eliminated twice and that many persons had 2 or more setbacks. FAST scores were located for 52% of the eliminees and 66% of the individuals with one or more setbacks. Twenty-one percent of the eliminees were eliminated because of a skill deficiency or a behavior problem (improper conduct); the remaining 79% were eliminated because of other problems (medical, IP shortage, etc.). Fifty-six percent of the setbacks were due to skill or behavior problems; the remaining 44% were due to other problems. Gender was unknown for 46% of the eliminees and 38% of the individuals with one or more setbacks. The number of known females was small for all four subsamples.



*American Indian

Figure E-4. Illustration of the size and composition of the comparison database.

Comments:

The comparison database includes individuals who completed IERW or AQC training during the period 1988-1995 and met each of the following criteria: (a) experienced no eliminations or setbacks, and (b) had a valid FAST test score on file at ARI. Although both the IERW comparison database and the AQC comparison database are large, white males accounted for 63% of the individuals in the IERW comparison group and 86% of the individuals in the AQC comparison group. No other single racial or gender group accounts for more than 4.4% to the total.

Appendix F

Causes of Eliminations and Setbacks

Comments:

In the following tables and figures, the term "eliminations" refers to training events in which a student "resigned," was "eliminated," or was "relieved" and not reinstated. Similarly, the term "setbacks" includes training events in which a student was "setback," "turned back," or was "relieved and reinstated."

The database contained 274 unique descriptors that were cited as causes of eliminations, setbacks, or both. Some descriptors were clear and specific in their identification of the cause of the elimination or setback. However, a large number of descriptors were so vague that it was difficult or impossible to determine whether the cause was due to (a) a skill/knowledge deficiency or behavioral problem, or (b) a personal problem or a purely administrative problem. In spite of this difficulty, all descriptors of cause were classified into two broad categories and numerous sub-categories. One broad category included descriptors that implied a knowledge/skill deficiency or a behavioral problem; the other category included all other descriptors.

Tables F-1 and F-2 list the causes of eliminations and setbacks that occurred prior to the time the student commenced flight training. The remaining tables (F-3 through F-10) list the causes of eliminations and setbacks that occurred during flight training. Separate tables are shown for IERW and AQC training.

Table F-1

Causes cited for eliminations prior to the start of IERW flight training.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=232)	% TOTAL** (N=891)
Resignation	101	43.5	11.3
Medical/Fitness	43	18.5	4.8
Misconduct	24	10.3	2.7
Failure to Progress	20	8.6	2.2
Unit Recall	15	6.5	1.7
Other Administrative	7	3.0	0.8
Academic	5	2.2	0.6
Lack of Motivation	4	1.7	0.4
Other Personal	1	0.4	0.1
Unknown	12	5.2	1.3

*The number of students who were eliminated prior to the start of IERW flight training.
**The total number of students eliminated prior to or during IERW flight training.

Comments:

Twenty-six percent of all students eliminated from the IERW program were eliminated prior to the start of flight training.

Resignation was given as the cause for 43.5% of the pre-flight eliminations and medical/fitness was given as the cause of 18.5% of the pre-flight eliminations. No data were recorded on the reasons for the resignations or the types of medical problems that led to the eliminations (only 4 students were eliminated because they failed the Army Physical Fitness Test). Discussions with SMEs indicated that a large proportion of resignations and medical eliminations are, in fact, due to knowledge/skill deficiencies or behavioral problems.

Misconduct and failure to progress were given as the causes of elimination in 10.3% and 8.6% of the cases, respectively. These numbers probably would be far higher if the true causes of resignations and medical eliminations were known. The same could be said for the causes academic (2.2%) and lack of motivation (1.7%)

Together, unit recall and other administrative problems were given as the cause of 9.5% of the pre-flight eliminations.

Table F-2

Causes cited for setbacks prior to the start of IERW flight training.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=419)	% TOTAL** (N=4,672)
Medical	142	33.9	3.0
Failure to Progress	101	24.1	2.2
Misconduct	52	12.4	1.1
Personal Problems	48	11.5	1.0
Behind Schedule	22	5.3	0.5
Physical Fitness	20	4.8	0.4
Academic	16	3.8	0.3
Attitude/Motivation	5	1.2	0.1
Other	13	3.1	0.3

*The number of students who were setback prior to the start of IERW flight training.
**The total number of setbacks prior to or during IERW flight training.

Comments:

Setbacks during pre-flight training accounted for only 9% of all setbacks that occurred during IERW training. By comparison, about 26% of all IERW eliminations occurred during pre-flight training.

The first eight descriptors listed above (excluding "other") account for 97% of all the causes cited for pre-flight setbacks.

Discussions with SMEs indicated that most of the medical setbacks during pre-flight training are, in fact, due to knowledge/skill deficiencies or behavioral problems. Hence, except for "personal problems," "physical fitness," and "other," the descriptors of cause listed in Table F-2 imply a knowledge/skill deficiency or a behavioral problem.

Table F-3

Eliminations during IERW flight training for which the cited cause was a skill/knowledge deficiency or behavioral problem.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=341)	% TOTAL** (N=891)
Flight Deficiency	274	80.4	30.8
Misconduct	58	17.0	6.5
Academic	7	2.1	0.8
Accident	2	0.6	0.2

*The number of students who were eliminated during IERW flight training due to knowledge/skill deficiencies or behavioral problems.
**The total number of students eliminated prior to or during IERW flight training.

Comments:

The numbers shown in Table F-3 include students who were clearly eliminated and students who were relieved from duty and not subsequently reinstated.

Clearly, knowledge or skill deficiency (flight deficiency, and academic) was a far more common cause of eliminations during IERW flight training than behavioral problems (misconduct). Even so, some form of misconduct was the cause cited for 17% of the eliminations in this group.

There is no reason to believe that test instruments could not be developed to detect both the knowledge/skill deficiencies and the behavioral problems that lead to elimination during the flight training portion of IERW.

It is noteworthy that academic failure accounts for only 2% of the eliminations in this group.

Table F-4

Eliminations during AQC flight training for which the cited cause was a skill/knowledge deficiency or behavioral problem.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=61)	% TOTAL** (N=210)
Flight Deficiency	47	77.0	22.4
Misconduct	11	18.0	5.2
Departed Without Clearing	1	1.6	0.5
Not Selected for Promotion	1	1.6	0.5
Academic	1	1.6	0.5

*The number of students who were eliminated during AQC training due to knowledge/skill deficiencies or behavioral problems.
**The total number of students eliminated during AQC training.

Comments:

Flight deficiency was cited as the cause of 77% of the AQC eliminations in this group (knowledge, skill, or behavior problems) and 22.4% of all AQC eliminations. Misconduct was a less frequent but non-trivial cause of AQC eliminations. It is interesting to note that flight deficiencies accounted for the same percentage (77%) of the IERW eliminations that were due to knowledge, skill, or behavior problems.

Although academics are quite difficult for most of the AQC aircraft, an academic failure was cited as the cause of only 1.6% of the eliminations in this group and only 0.5% of all AQC eliminations.

Table F-5

Eliminations during IERW flight training for which the cited cause was a factor other than a skill/knowledge deficiency or behavioral problem.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=326)	% TOTAL** (N=891)
Resignation	160	49.1	18.0
Medical	100	30.7	11.2
Administrative Problems	30	9.2	3.4
Body Size or Fitness	12	3.7	1.3
Unit Recall	10	3.1	1.1
Personal Problems	2	0.6	0.2
Other	12	3.7	1.3

*The number of students who were eliminated during IERW training due to causes other than knowledge/skill deficiencies or behavioral problems.
**The total number of students eliminated during IERW training.

Comments:

Resignation was cited as the cause of 18% of all IERW eliminations and nearly one-half of the eliminations in this group. The reasons for the resignations were not recorded. Discussions with SMEs knowledgeable about IERW trainees indicate that resignations are the result of poor performance during training, a fear of flying, a lack of motivation, or a combination of these factors. Hence, the factors that contributed to resignations appear to be the same as the factors that contributed to eliminations.

Medical was cited at the cause of 30.7% of the eliminations in this group. The SMEs indicated that the true cause of many medical eliminations was poor performance during training, a fear of flying, or a lack of motivation. Apparently, some students find a medical elimination to be more palatable than a flight-deficiency elimination or a resignation.

Together, unit recall and other administrative problems accounted for 12.3% of the eliminations in this group.

It is interesting to note that 7 students were eliminated because they were too tall and 4 students were eliminated because they were too short.

Table F-6

Eliminations during AQC flight training for which the cited cause was a factor other than a skill/knowledge deficiency or behavioral problem.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=148)	% TOTAL** (N=210)
Unit Recall	39	26.4	18.6
Resignation	30	20.3	14.3
Aircraft Grounding	20	13.5	9.5
Lack of Prerequisites	18	12.2	8.6
Administrative Problems	17	11.5	8.1
Medical	15	10.1	7.1
Death	7	4.7	3.3
Over Weight	2	1.4	1.0

*The number of students who were eliminated during AQC training due to causes other than knowledge/skill deficiencies or behavioral problems.
**The total number of students eliminated during AQC training.

Comments:

About 19% of all AQC eliminations and 26.4% of the eliminations in this group are due to unit recall. The reasons for the unit recall are not known. It is possible that some students are recalled because of poor performance in training, but there is no evidence to support this claim.

About 14% of all AQC eliminations and 20.3% of the eliminations in this group are due to resignations. Discussions with SMEs indicated that most AQC resignations are due to poor performance in training.

It seems curious that 8.6% of all AQC eliminations were due to the students' lack of prerequisites. It also is of interest that aircraft grounding was cited as the cause of 9.5% of all AQC eliminations and 13.5% of the eliminations in this group.

The number of medical eliminations (7.1% of total) that were, in fact, due to poor performance in training is not known.

Table F-7

Setbacks during IERW flight training for which the cited cause was a skill/knowledge deficiency or behavioral problem.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=1,322)	% TOTAL** (N=4,672)
Flight Deficiency	1211	91.6	25.9
Misconduct	89	6.7	1.9
Academic	13	1.0	0.3
Company Action	5	0.4	0.1
Motivation/Attitude	2	0.2	0.0
Other	2	0.2	0.0

*The number of setbacks during IERW training due to knowledge/skill deficiencies or behavioral problems.
**The total number of setbacks during IERW training.

Comments:

A total of 36 different descriptors were cited as the cause of this group of setbacks. These descriptors were classified into the 6 categories listed above in Table F-7.

Nearly 26% of all IERW setbacks and nearly 92% of the setbacks in this group were due to a flight deficiency. In contrast, an academic deficiency was cited as the cause of very few IERW setbacks (0.3% of total).

Misconduct and motivation/attitude were cited as the causes of a small but non-trivial parentage (about 2%) of all IERW setbacks. It is probable that the cause descriptor "company action" indicates some type of misconduct.

Table F-8

Setbacks during AQC flight training for which the cited cause was a skill/knowledge deficiency or behavioral problem.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=284)	% TOTAL** (N=581)
Flight Deficiency	277	97.5	47.7
Misconduct	5	1.8	0.9
Academic	2	0.7	0.3

*The number of setbacks during AQC training due to knowledge/skill deficiencies or behavioral problems.
**The total number of setbacks during AQC training.

Comments:

Flight deficiency was the cited cause of 47.7% of all AQC setbacks and 97.5% of the setbacks in this group. All other causes of setbacks combined account for only 1.2% of all AQC setbacks and 2.5% of the setbacks in this group.

Table F-9

Setbacks during IERW flight training for which the cited cause was a factor other than skill/knowledge deficiency or behavioral problem.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=2.925)	% TOTAL** (N=4,672)
IP Shortage	1463	50.0	31.3
Medical	829	28.3	17.7
Personal Problems	309	10.6	6.6
Behind Schedule	151	5.2	3.2
Weather/Maintenance	27	0.9	0.6
Other Administrative	26	0.9	0.6
Physical Fitness	20	0.7	0.4
Aircraft Shortage	18	0.6	0.4
Other	82	2.8	1.8

*The number of setbacks during IERW training due to a factor other than knowledge/skill deficiencies or behavioral problems.
**The total number of setbacks during IERW training.

Comments:

A total of 77 different descriptors were cited as the cause of this group of setbacks. These descriptors were classified into the 9 categories listed above in Table F-9.

The two most frequently cited causes of IERW setbacks in this group are IP Shortage (50.0%) and medical (28.3%). SMEs indicated that many of the medical setbacks were, in fact, due to knowledge/skill deficiencies or behavioral problems.

A variety of personal problems were cited as the cause of a substantial percentage of setbacks (6.6% of total and 10.6% of group). Examples of the descriptors include emergency leave, leave, family emergency, and personal (unspecified).

A descriptor indicating that the student was behind the training schedule was cited as the cause of 3.2% of all setbacks and 5.2% of the setbacks in this group. The reasons why the student was behind schedule were not reported.

Physical fitness (lack of), other administrative problems, weather and maintenance delays, and aircraft shortages accounted for a small but non-trivial percentage of the setbacks.

Table F-10

Setbacks during AQC flight training for which the cited cause was a factor other than skill/knowledge deficiency or behavioral problem.

DESCRIPTOR OF CAUSE	NUMBER	% GROUP* (N=297)	% TOTAL** (N=581)
Medical	118	39.7	20.3
Personal Problems	61	20.5	10.5
Behind Schedule	47	15.8	8.1
IP Shortage	33	11.1	5.7
Weather maintenance	30	10.1	5.2
Other Administrative	5	1.7	0.9
Other	3	1.0	0.5

*The number of setbacks during AQC training due to a factor other than knowledge/skill deficiencies or behavioral problems.
**The total number of setbacks during AQC training.

Comments:

A total of 21 different descriptors were cited as the cause of this group of setbacks. These descriptors were classified into the 7 categories listed above in Table F-10.

Medical was cited as the cause of 20.3% of all AQC setbacks and 39.7% of the setbacks in this group. SMEs stated that most of the medical setbacks during AQC are, in fact, due to a temporary medical problem (e.g., colds, ear infections, clogged sinus tracts). Even so, it is probable that some students who are not progressing as rapidly as their peers may claim a medical problem in order to gain additional time for study or practice.

Leave for emergencies and other personal problems were cited as the cause of 10.5% of all AQC setbacks and 20.5% of the setbacks in this group.

Although "behind Syllabus" was cited as the cause of 8.1% of all AQC setbacks, the reason the student was behind syllabus was not reported.

IP Shortage was cited as the cause of only 5.7% of all AQC setbacks (vs. 31.3% of all IERW setbacks).

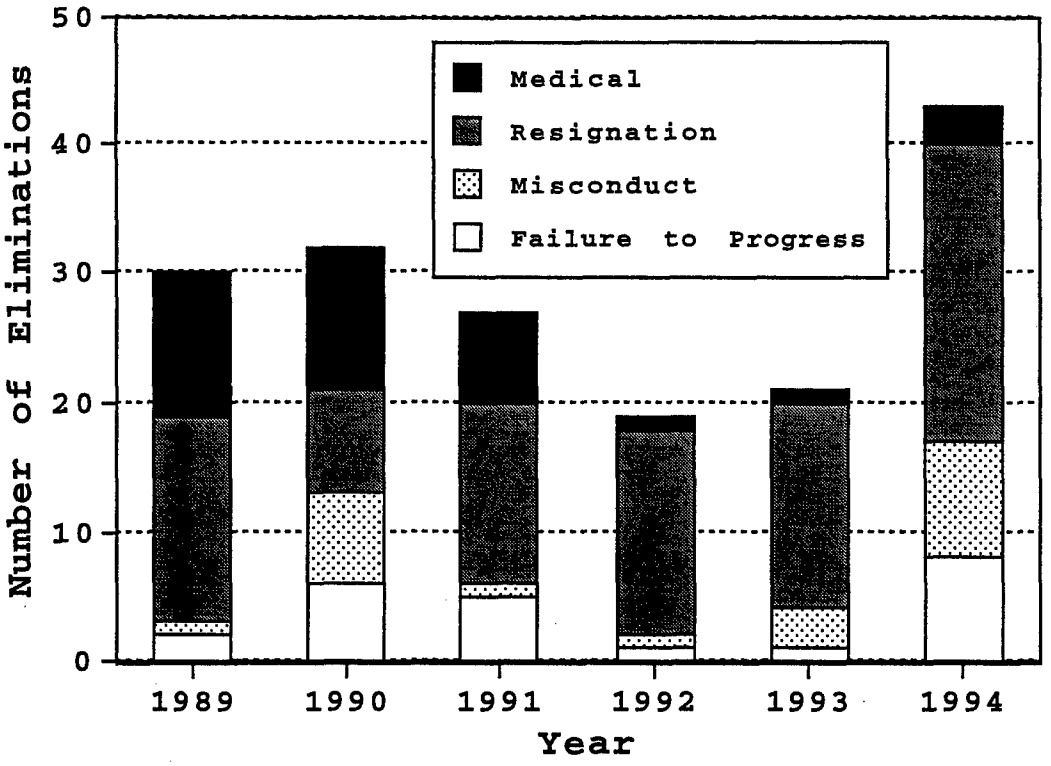


Figure F-1. Frequency of four causes cited for eliminations prior to the start of IERW flight training, by year.

Comments:

Only one pre-flight elimination was reported for 1995. This is surprising in light of the large number of pre-flight eliminations reported for 1994. This finding may be an artifact of the data reporting or data coding system.

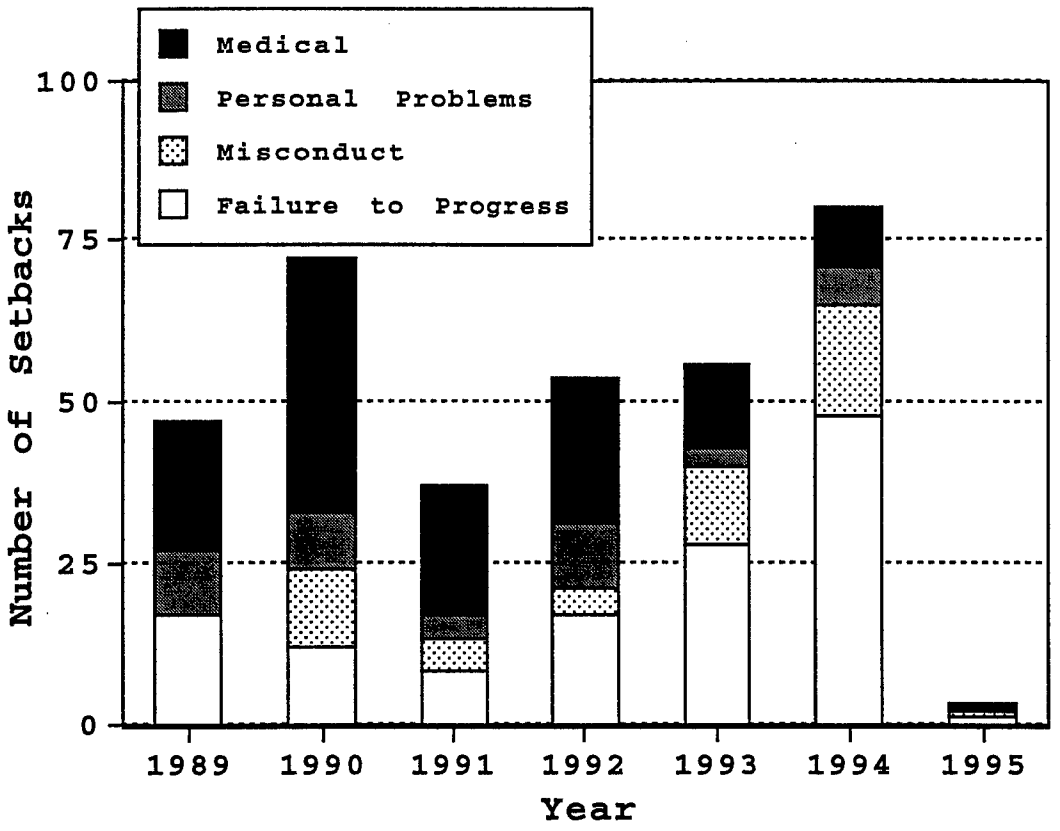


Figure F-2. Frequency of four causes cited for setbacks prior to the start of IERW flight training.

Comments:

The four causes of setbacks shown in Figure F-2 account for 91% of all the setbacks that occurred prior to the start of IERW flight training.

The small number of setbacks shown for 1995 may be an artifact stemming from a change in the reporting or coding system.

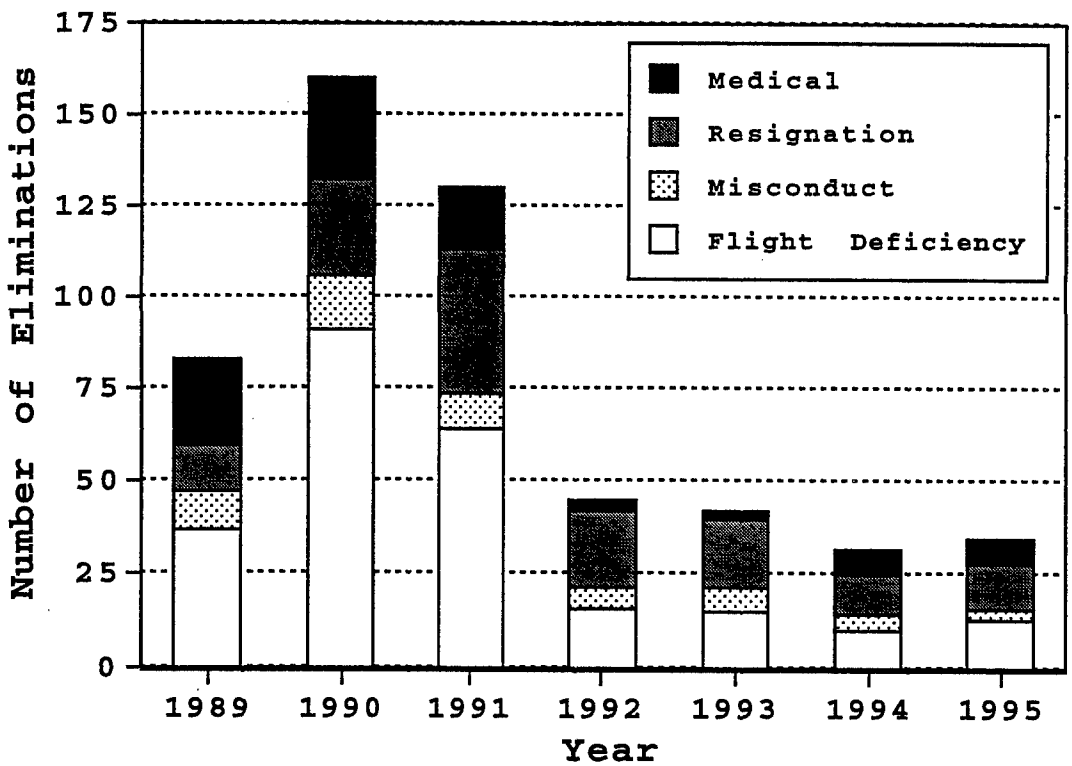


Figure F-3. Frequency of four causes cited for eliminations that occurred during IERW flight training.

Comments:

The four causes of eliminations shown in Figure F-3 account for 89% of all the eliminations that occurred during IERW flight training.

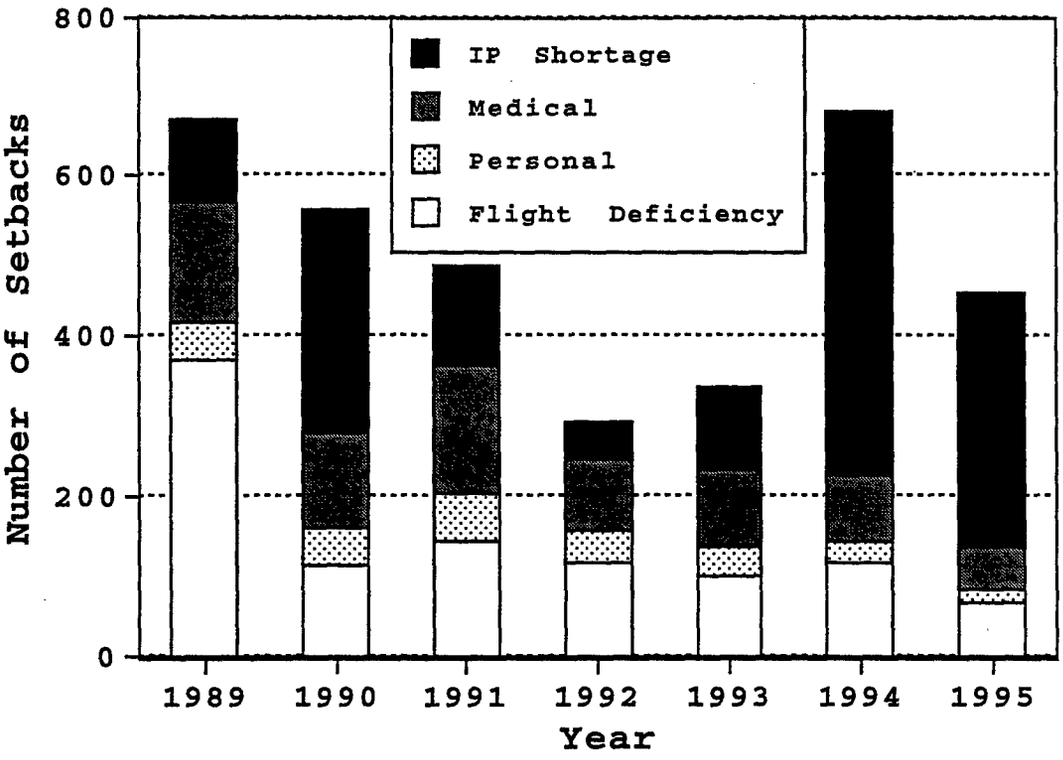


Figure F-4. Frequency of four causes cited for setbacks that occurred during IERW flight training.

Comments:

The four causes of setbacks shown in Figure F-4 account for 90% of all the setbacks that occurred during IERW flight training.

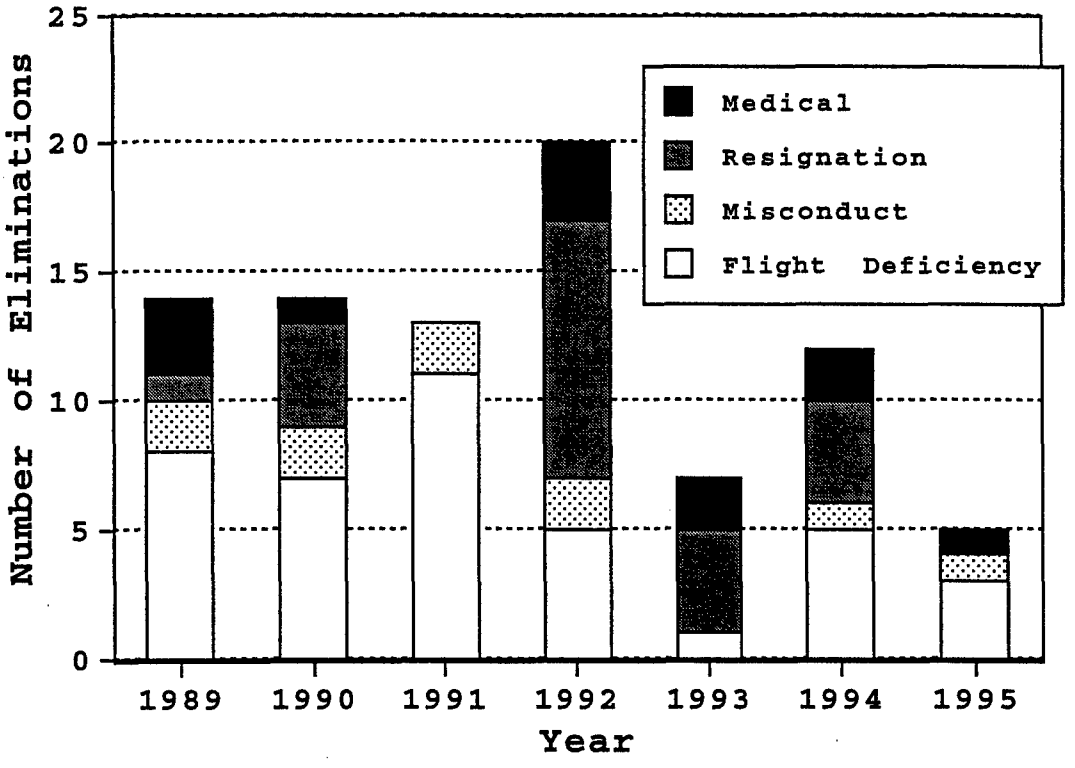


Figure F-5. Frequency of four causes cited for eliminations that occurred during AQC training.

Comments:

The four causes of eliminations shown in Figure F-5 account for only 46% of all the eliminations that occurred during AQC training. In contrast, the same four causes account for 90% of all the eliminations that occurred during IERW flight training. A large portion of AQC eliminations stem from administrative problems such as unit recall, administrative scheduling problems, administrative errors, and aircraft groundings.

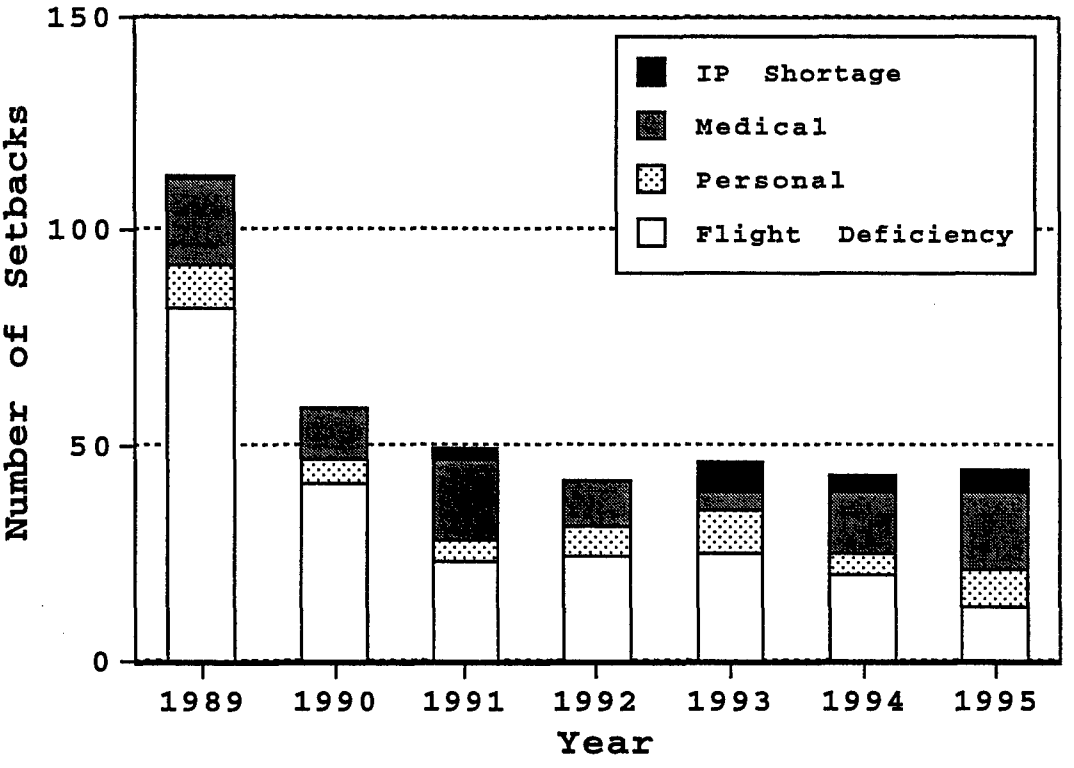


Figure F-6. Frequency of four causes cited for setbacks that occurred during AQC training.

Comments:

The four causes of setbacks shown in Figure F-6 account for 84% of the setbacks that occurred during AQC training. It is noteworthy that IP shortage is cited as the cause of relatively fewer AQC setbacks than IERW setbacks.

Appendix G
Results of Cut-Score Analysis

Comments:

The figures in Appendix G show cumulative distributions of FAST scores for (a) IERW eliminees, (b) AQC eliminees, (c) IERW non-eliminees who experienced one or more setbacks during training, and (d) AQC non-eliminees who experienced one or more setbacks during training. Separate distributions are shown for white males and non-white males. The sample size for individual racial groups (e.g., Black, Hispanic, Asian, American Indian) was too small to support reliable cumulative distributions by racial group.

A cumulative distribution is shown for female IERW students that were either eliminated or experienced one or more setbacks. The female sample size was too small to show cumulative distributions as a function of type of training event (elimination vs. setback) or race (white vs. non-white).

In every figure, a cumulative distribution is shown for a comparison group. The comparison groups consists of individuals who (a) completed training (IERW or AQC) with no setbacks and (b) have the same gender and race (white or non-white) as the eliminees or setbacks whose cumulative distribution is shown in the figure.

The FAST score was not available for every individual in the database who was eliminated or who experienced one or more setbacks. Even so, the sample size for all the cumulative distributions shown in the following figures is large enough to be reliable.

The group of eliminees included individuals who were eliminated and individuals who were relieved and not reinstated. The group of setbacks include individuals who were setback, turned back, or relieved and reinstated.

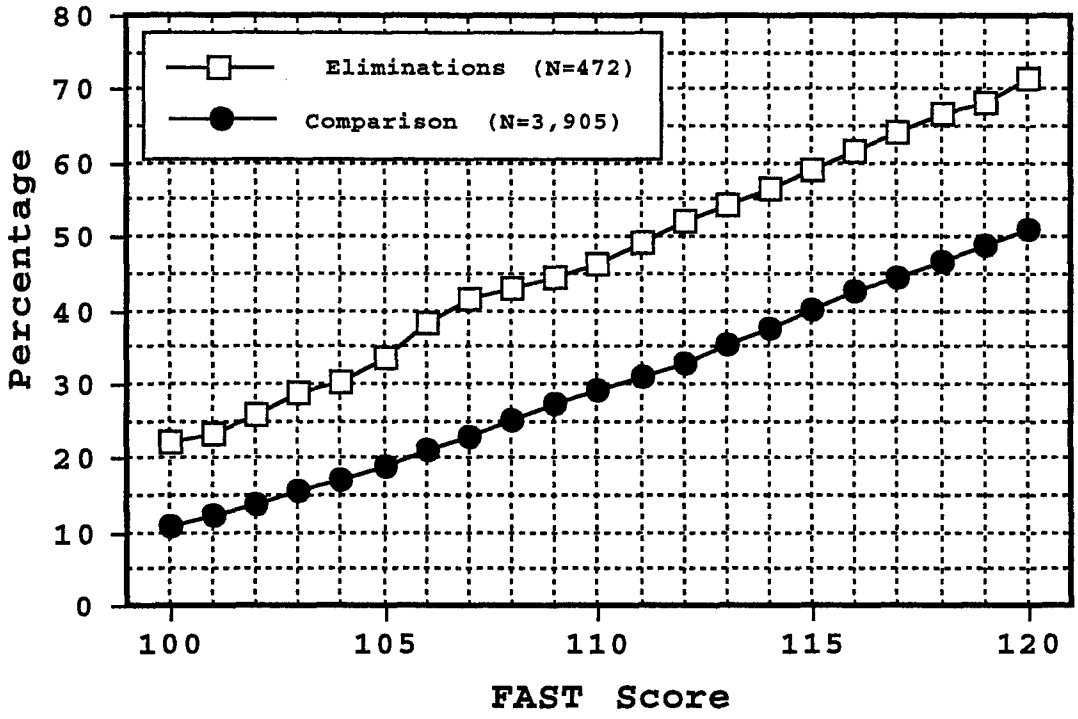


Figure G-1. Cumulative distribution of FAST scores for white male IERW-eliminees and white male comparison group members. Includes individuals who were enrolled in the IERW training program during the period 1988-1995.

Comments:

The purpose of the cumulative distributions in Figure G-1 and all that follow is to show the result of increasing the FAST cut score. For example, consider the effect of increasing the cut score to 100. It can be seen that a cut score of 100 would have excluded (a) about 11% of the individuals who completed IERW successfully, with no setbacks (comparison curve), and (b) about 23% of the individuals who were eliminated (eliminations curve). Similarly, increasing the cut score to 110 would have excluded about 29% of the comparison group members and 47% of the eliminees.

The two curves diverge as FAST score increases; this indicates that the relative benefits of increasing cut score tends to become greater cut score increases.

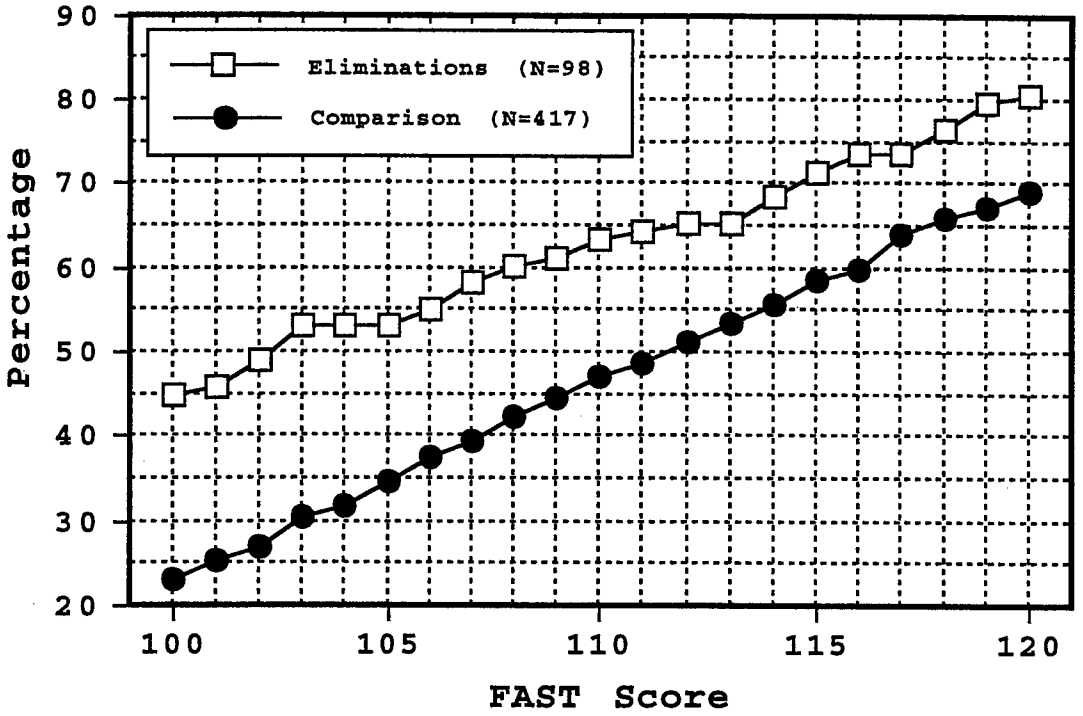


Figure G-2. Cumulative distribution of FAST scores for non-white male IERW-eliminees and white male comparison group members. Includes individuals who were enrolled in the IERW training program during the period 1988-1995.

Comments:

Increasing cut score to 100 would have excluded about 45% of the non-white eliminees, but at a cost of about 23% of the non-white males who completed IERW with no setbacks.

The two curves tend to converge as FAST score increases. This indicates that the relative benefits of increasing cut score becomes smaller as cut score increases.

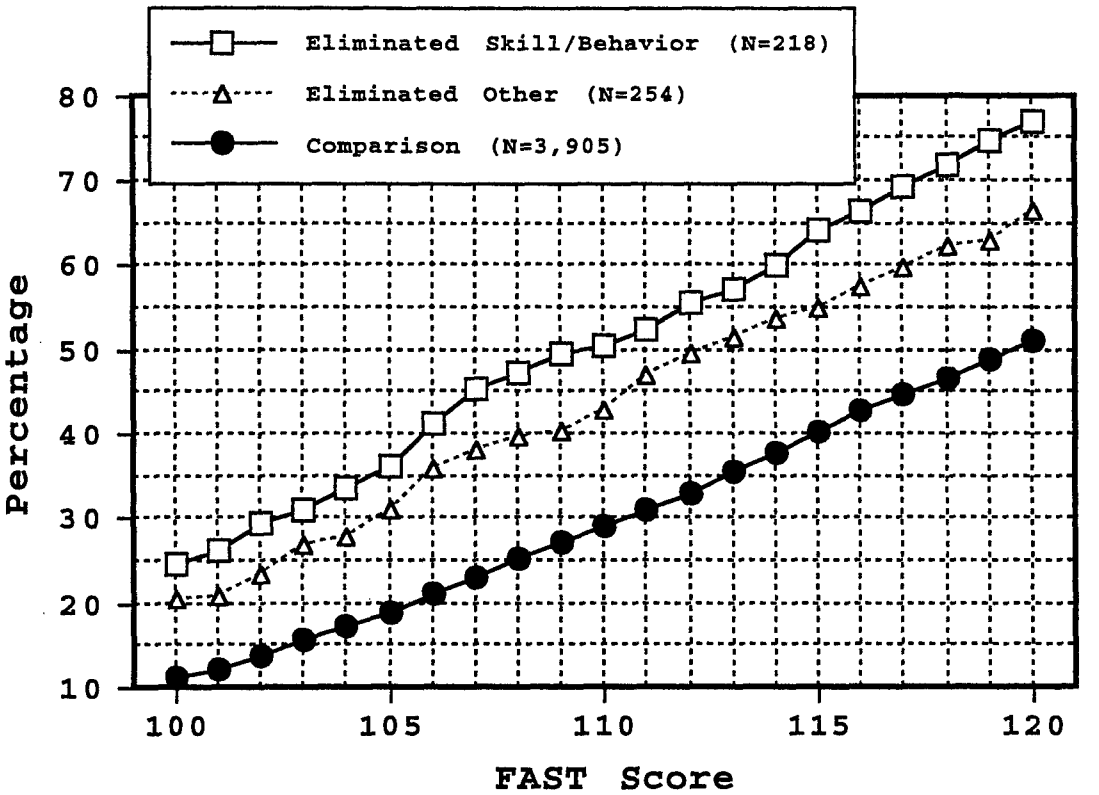


Figure G-3. Cumulative distributions of FAST scores for white male IERW-eliminees as a function of the cause cited for elimination. Includes individuals who were enrolled in the IERW training program during the period 1988-1995.

Comments:

The cumulative distribution for the individuals eliminated because of a skill deficiency is quite similar to the cumulative distribution for the individuals who were eliminated for other reasons. However, the distributions of both groups of eliminees are quite different from the comparison group distribution. This finding supports the claims of SMEs that many of the individuals eliminated for other reasons (e.g., medical, resignation, personal) were, in fact, eliminated because of skill deficiencies or behavioral problems.

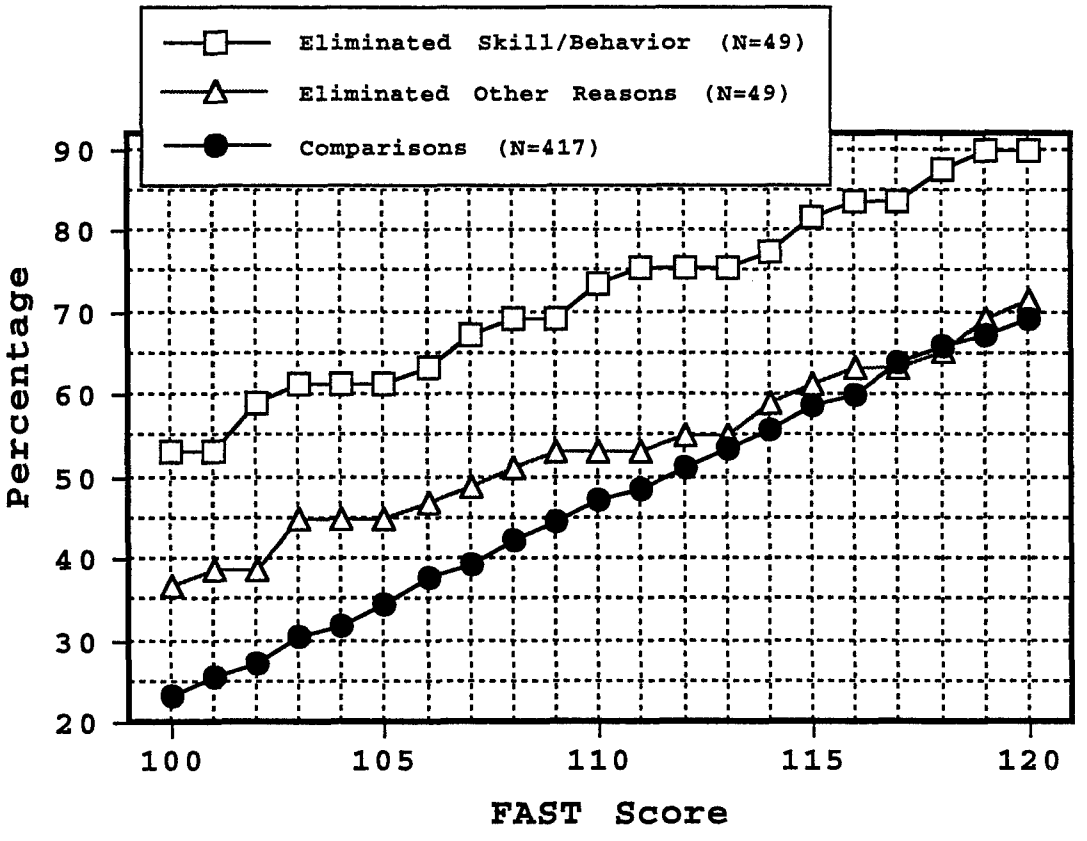


Figure G-4. Cumulative distributions of FAST scores for non-white male IERW-eliminees with individuals grouped in terms of the cited cause of the elimination. Includes individuals who were enrolled in the IERW training program during the period 1988-1995.

Comments:

The cumulative distribution for the individuals eliminated because of a skill deficiency is quite different from the cumulative distribution for the individuals who were eliminated for other reasons. This finding suggests that many of the non-white males eliminated for other reasons are, in fact, eliminated for reasons other than a skill deficiency or a behavioral problem. In this respect, non-white male eliminees differ from white male eliminees.

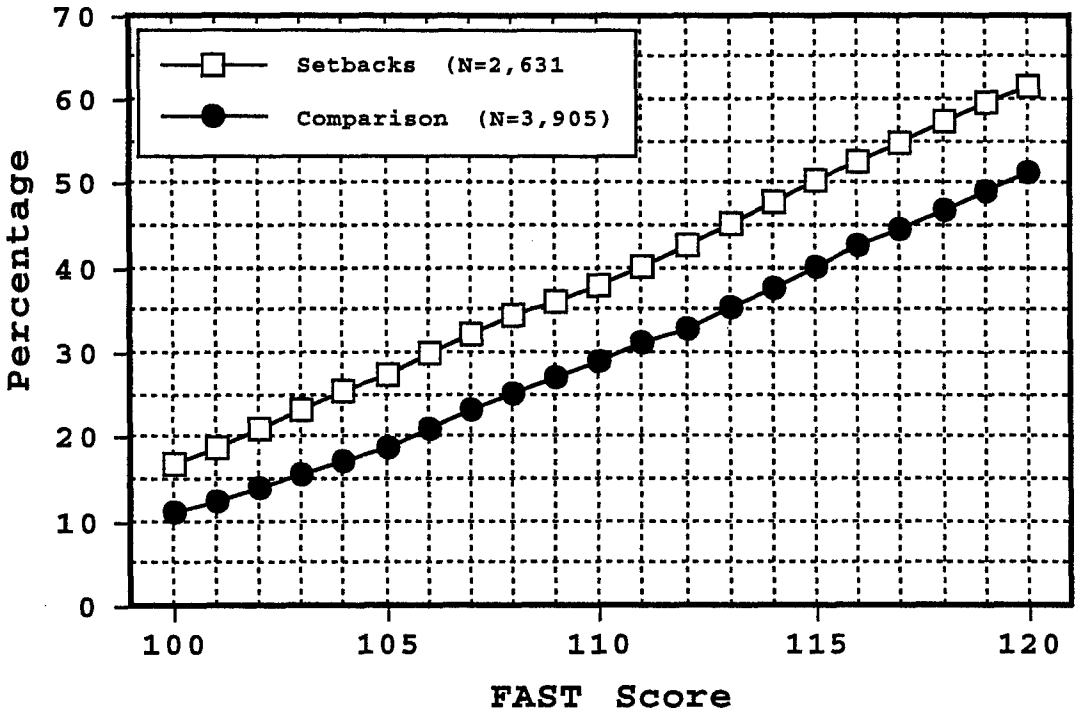


Figure G-5. Cumulative distributions of FAST scores for white males with IERW setbacks and white males with no IERW setbacks. Includes individuals who were enrolled in the IERW training program during the period 1988-1995.

Comments:

The cumulative distribution for individuals with one or more IERW setbacks is only slightly different from the cumulative distribution of individuals with no IERW setbacks. Hence, increasing cut score would exclude only 5-8% more individuals with setbacks than individuals who completed IERW training with no setbacks.

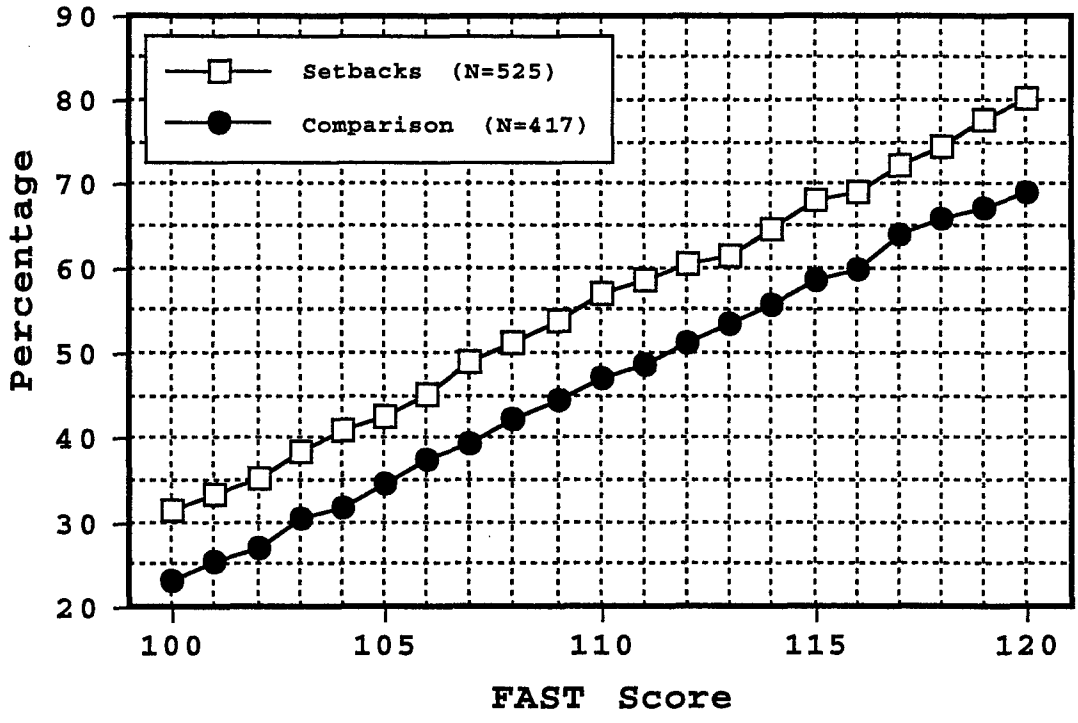


Figure G-6. Cumulative distributions of FAST scores for non-white males with IERW setbacks and non-white males with no IERW setbacks Includes individuals who were enrolled in the IERW training program during the period 1988-1995.

Comments:

As was true for white males,the cumulative distribution for non-white males with one or more IERW setbacks is only slightly different from the cumulative distribution for non-white males with no IERW setbacks. Increasing cut score would exclude only 5-8% more individuals with setbacks than individuals who completed IERW training with no setbacks.

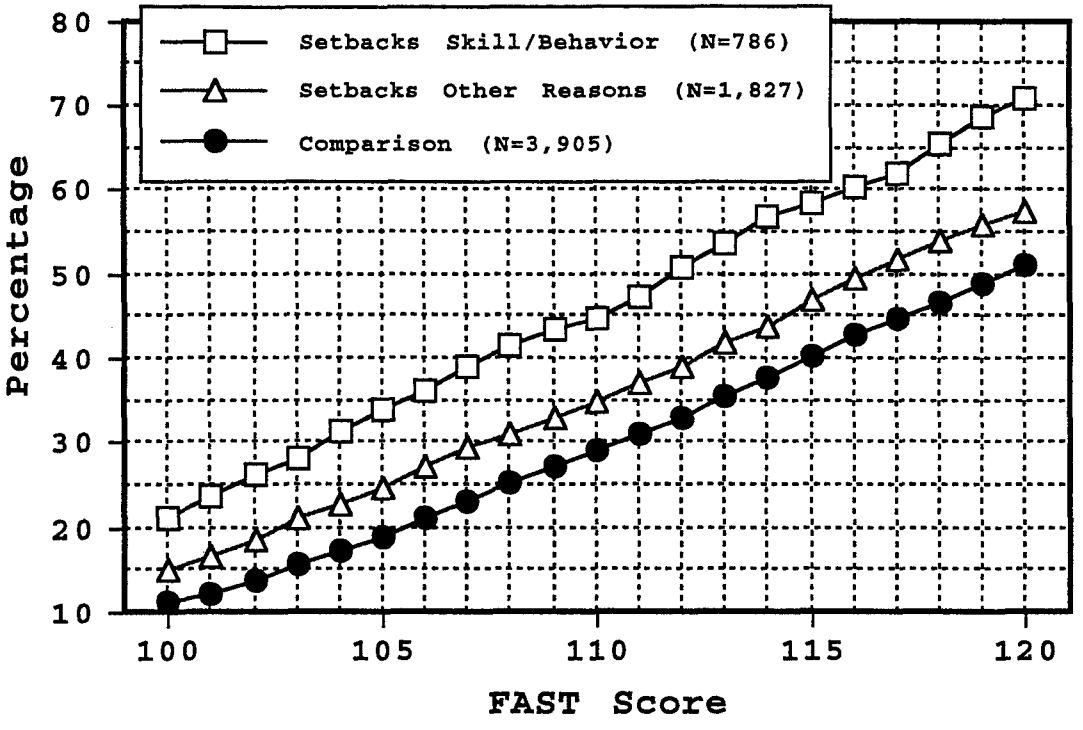


Figure G-7. Cumulative distributions of FAST scores for white males with one or more IERW setbacks, with individuals grouped in terms of the cited cause of the setback. Includes individuals who were enrolled in the IERW training program during the period 1988-1995.

Comments:

The cumulative distribution of individuals whose setback was due to a skill deficiency or behavioral problem differs substantially from the distributions of the other two groups. This means that increasing cut score will exclude (a) 10-15% more students with skill/behavior setbacks than students with no setbacks and (b) 7-15% more students with skill/behavior setbacks than students with setbacks caused by other factors.

The curves tend to diverge as FAST score increases. This means that the benefits tend to become greater as the cut score is increased.

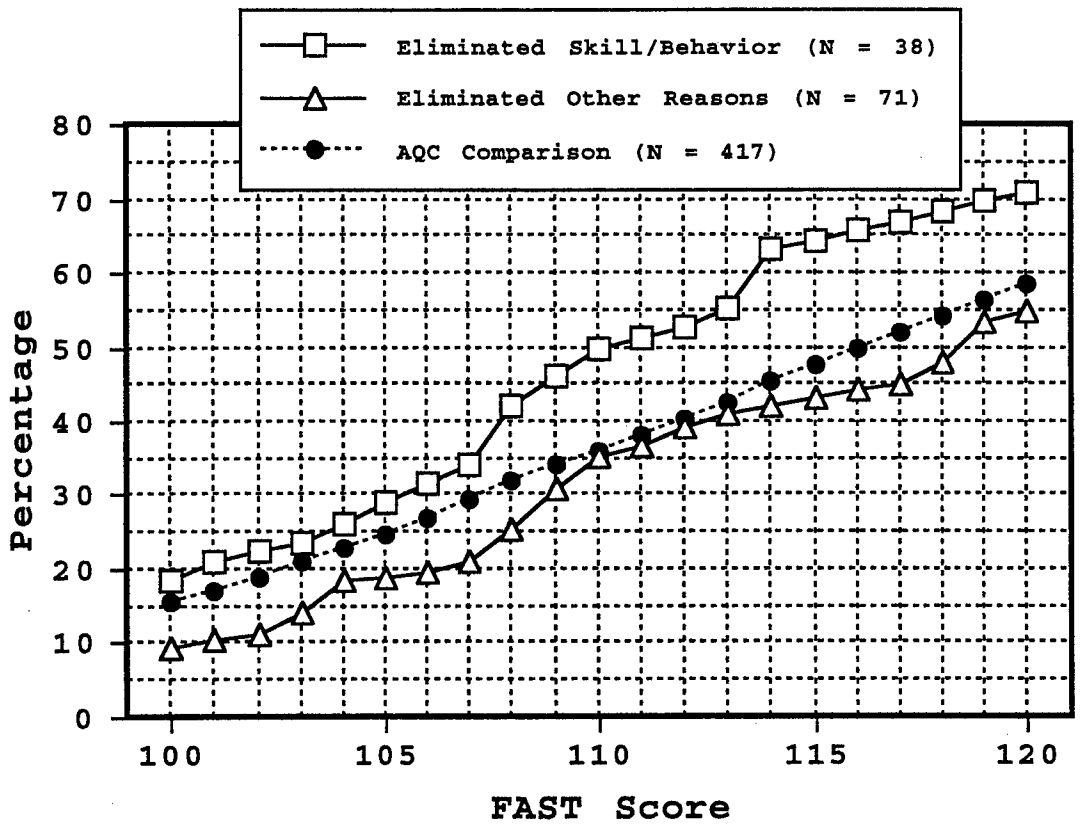


Figure G-8. Cumulative distributions of FAST scores for AQC eliminees who have been grouped in terms of the cited cause of the elimination. Includes individuals who were enrolled in an AQC course during the period 1988-1995.

Comments:

The above distributions show little or no benefit of increasing cut score to any value below about 108. For cut scores higher than 108, between 10% and 18% more eliminees (skill/behavior) would be excluded than members of the comparison group. It is noteworthy that increasing cut score to any value between 100 and 120 would exclude about the same percentage of the comparison group as individuals eliminated for reasons other than a skill or behavior problem. Because of the small number of ACQ eliminees, however, the eliminee distributions shown in Figure G-8 cannot be considered to be highly reliable.

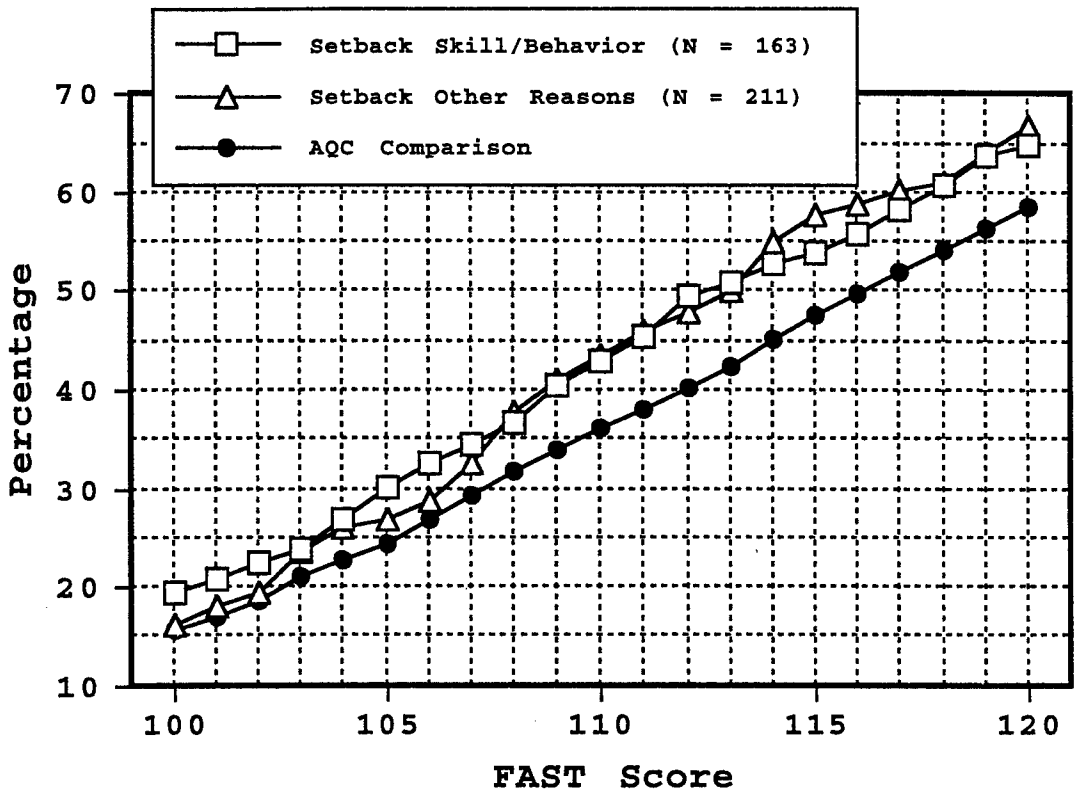


Figure G-9. Cumulative distributions of FAST scores for AQC students with one or more setbacks who have been grouped in terms of the cited cause of the elimination. Includes individuals who were enrolled in an AQC course during the period 1988-1995.

Comments:

The distributions for AQC students with setbacks show that cut score would have to be increased to about 108 to exclude a larger percentage of AQC students with setbacks than studencts in the ACQ comparison group. Even for values above 108, the difference is 10% or less.

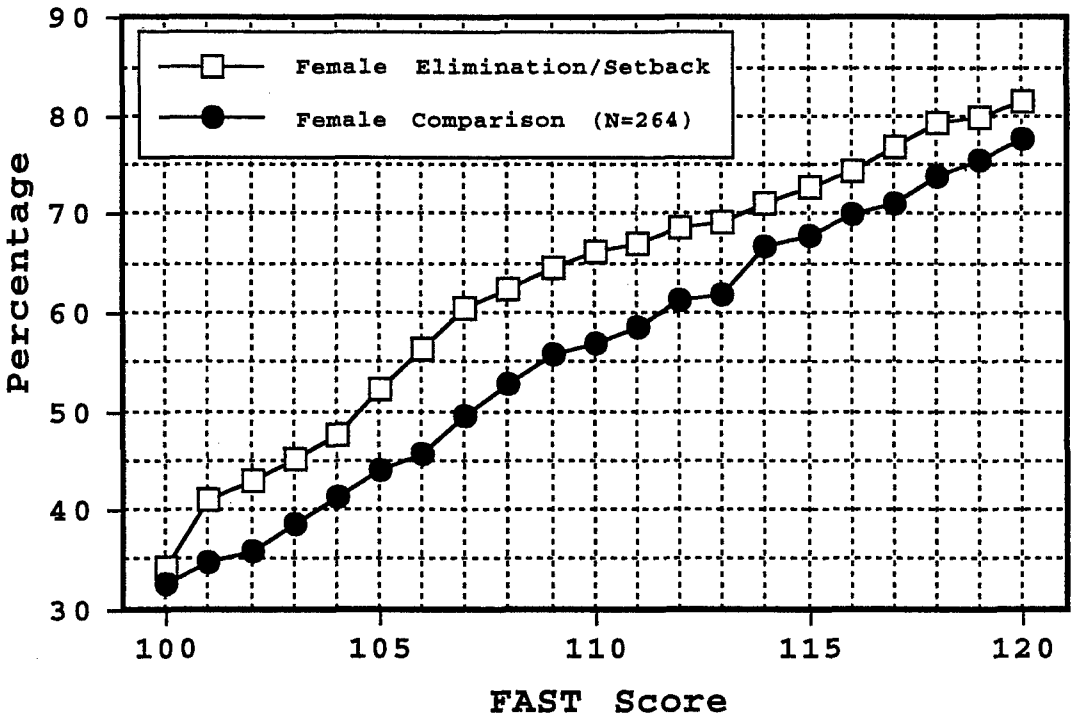


Figure G-10. Cumulative distributions of FAST scores for females with IERW setbacks or eliminations and females who completed IERW training with no setbacks. Includes individuals who were enrolled in the IERW training program during the period 1988-1995.

Comments:

Because of the small sample size, the cumulative distributions shown above are far more irregular than the cumulative distributions depicted in Figures G1-G9. Even so, the distributions shown in Figure G-10 provide no indication that the FAST's predictive validity is no better or worse for female IERW students than for male IERW students.